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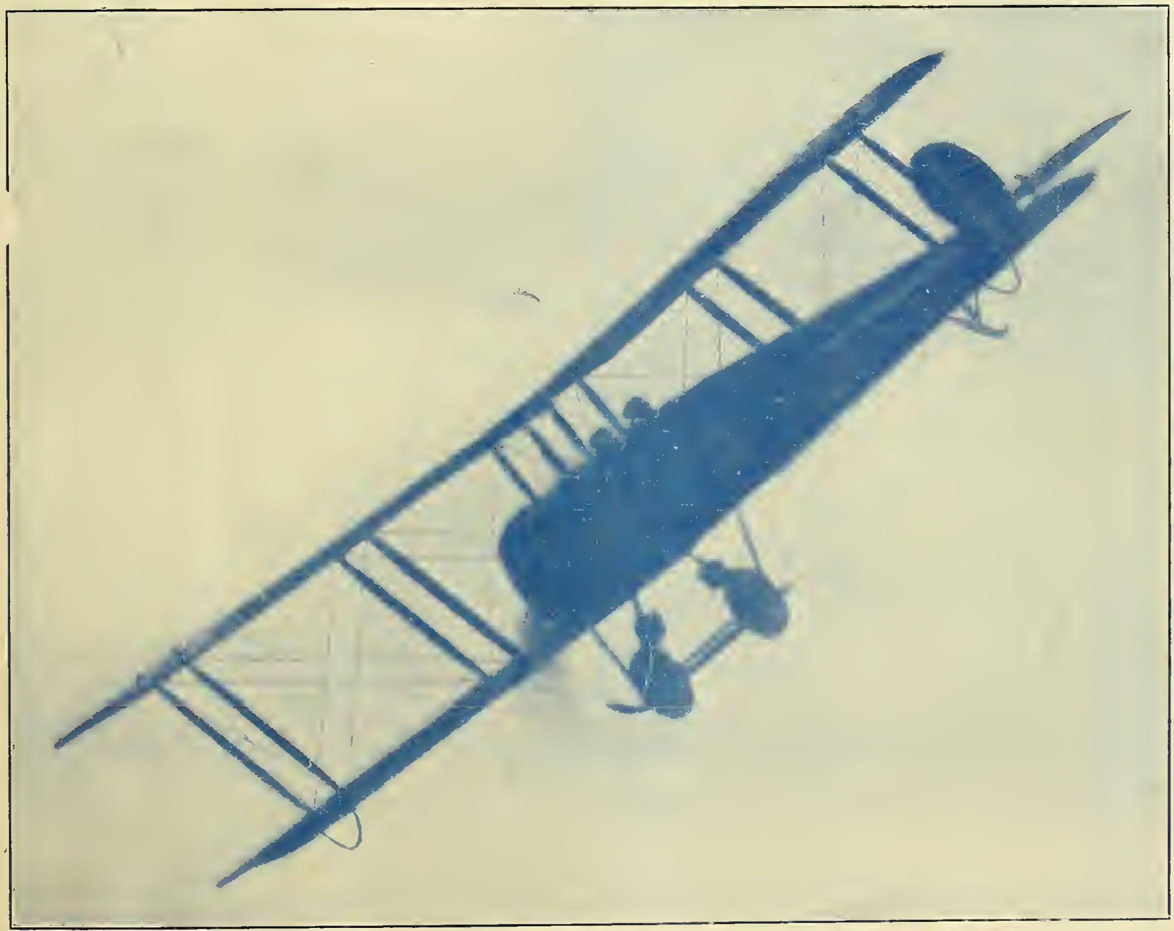
AERIAL AGE
WEEKLY

Vol. 8, No. 8 NOVEMBER 4, 1918 10 CENTS A COPY



An Avro Aeroplane snapped from an F. B. A. Flying Boat while making a bank

140 AMERICAN PLANES BOMB GERMAN CONCENTRATION CAMPS

AVIATION CARNIVAL AT BELMONT PARK A STUPENDOUS EVENT

LISHED WEEKLY BY THE AERIAL AGE COMPANY, INC., FOSTER BUILDING, MADISON AVENUE AND FORTIETH STREET, NEW YORK CITY
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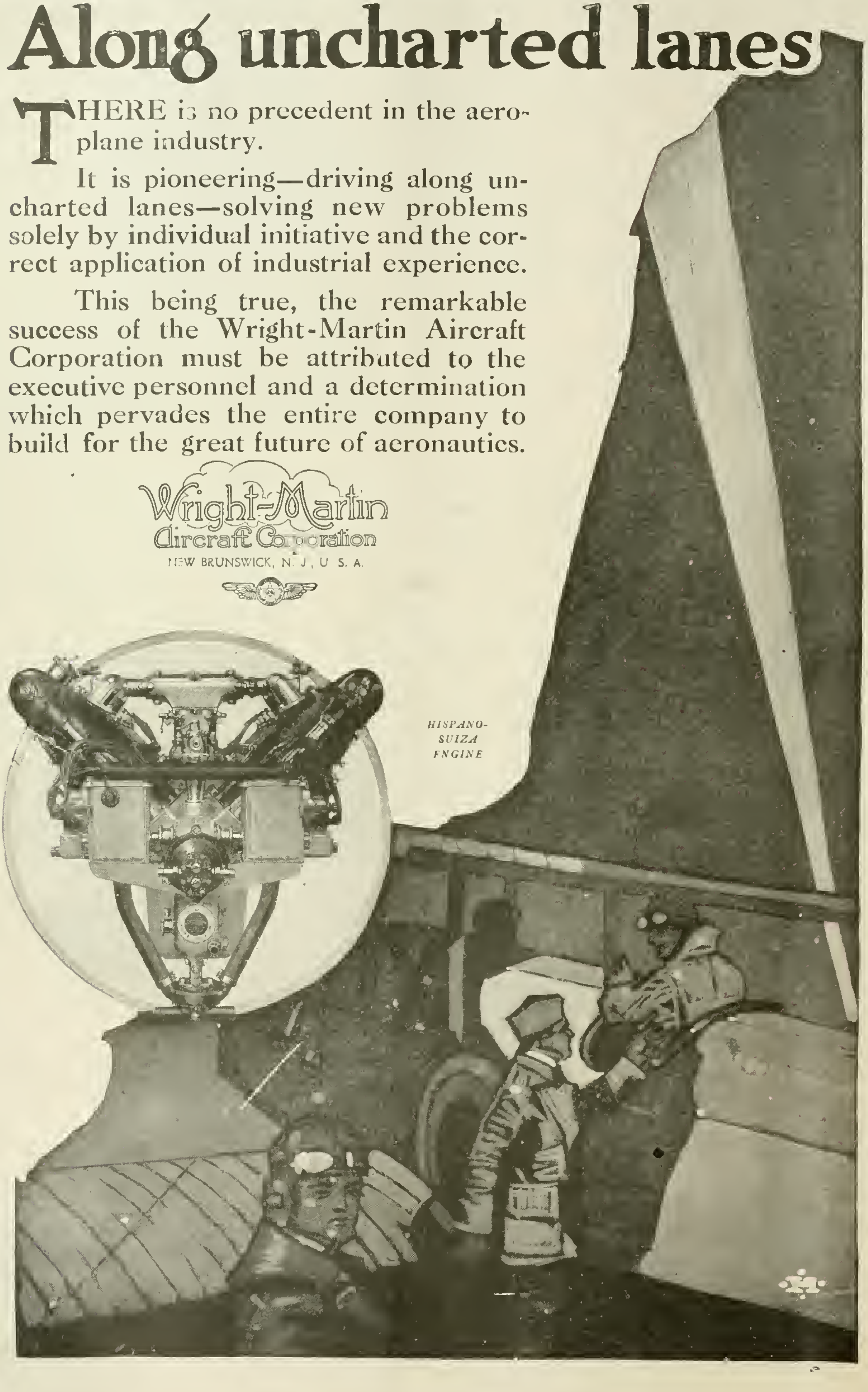

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1918

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machine produced by the
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Builders of dependable ignition apparatus and lighting generators standardize on "NORMA" Precision Bearings — knowing that bearing failure in these secondary units will cripple the best airplane, car, truck, tractor, or power boat, and relying upon "NORMA" Quality to guard against it.

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1790 BROADWAY NEW YORK
Ball, Roller, Thrust, Combination Bearings

AERIAL AGE
WEEKLY

VOL. VIII NOVEMBER 4, 1918 No. 8

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WHEN THE GLORIOVS DAWN OF VICTORY COMES AND THE TRVE STORY OF THE WAR CAN BE TOLD, IT WILL BE FOVND THAT CVRTISS AEROPLANES AND CVRTISS MEN HAVE "DONE THEIR BIT."

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VOL. VIII NEW YORK, NOVEMBER 4, 1918 NO. 8

140 AMERICAN PLANES BOMB GERMAN TROOP CONCENTRATION CAMPS

THE following Associated Press despatch indicates that the American air forces are participating in hostilities on the Western Front on a huge scale:

"German troop concentrations in the region of Briquenay, north of Grand Pré, were bombed this afternoon by about sixty all-American bombing aeroplanes, with about eighty pursuit planes protecting them. Formations of from fifteen to twenty German machines attempted to drive off the Americans, and several aerial combats resulted.

"Lieutenant Edward Rickenbacher was among the airmen in pursuit planes accompanying the bombing squadron. He engaged in two aerial combats and brought down a German machine within the American lines near Exermont. Rickenbacher followed the enemy machine close to the ground until he saw the enemy aviator land and fall into the hands of American infantrymen. Returning to his aeroplane, Rickenbacher heard the news of his promotion to a Captaincy.

"The weather was fairly clear when word came that German troops were arriving at Briquenay by trains and that they were marching and being transported toward the Bourgogne Wood. An expedition was quickly organized and was soon on the wing.

"In addition to bombing Briquenay and the railroad, the bombers dropped a few bombs in woods near by, and the pursuit planes attacked enemy troops with small bombs and machine guns. The bombers report excellent results, direct hits being obtained upon railroad sheds.

"Two American planes are reported missing. Over Grand Pré the left wing of a plane was struck by a German anti-aircraft shell and the machine fell in flames within the German lines. The identity of the machine is uncertain, but it is believed to have been an American.

"To be shot down twice within a week by German airmen has been the experience of Lieutenants Arthur Newell of Berkeley, Cal., and Walter Ten Eyck, Jr., of Brooklyn. Both times the Americans landed within their own lines. They declare they brought down two German machines in their encounters with the enemy. Lieutenant Newell acted as observer and Lieutenant Ten Eyck as pilot.

"Accompanying the all-American bombing squadron on Oct. 18 their machine was attacked from the rear by five Germans. Lieutenant Newell, at the machine gun, saw one of the Germans fall. The others continued firing and the gasoline tank of the American machine was pierced twice, but the momentum of the aeroplane prevented the gasoline from escaping and catching fire.

"Lieutenants Newell and Ten Eyck were members of a day bombing squadron which flew over Buzancy last Wednesday. On the return they were attacked by three German machines and brought down one of them. The engine of their machine was pierced by a number of bullets and put out of commission, but the Americans landed safely south of Brieulles. In the fight a bullet grazed Newell's nose, while another bullet bruised Ten Eyck's cheek."

2,500 Planes Sent Over in 5 Months

Production of American aircraft has reached a state where it is limited practically only by facilities for transporting the aeroplanes to France. The production of Liberty motors during October reached one thousand a week—a goal which had not been hoped for at the soonest until December.

The latest official compilations show that since June 1 approximately 2,500 fighting aeroplanes of all descriptions have been shipped to the American forces in France.

AVIATION CARNIVAL AT BELMONT PARK A STUPENDOUS EVENT

THE greatest aerial carnival ever held, an event such as would sell a billion dollars of Liberty Bonds, was the Carnival organized by Mrs. Charles A. Van Rensselaer, the chairman of the National Aeronautic Committee, and held at Belmont Park on October 26th.

It would take many pages to give a complete account and lack of space prevents it.

A billion dollars or more in Liberty Bonds could have been sold because the event was so stupendous that about 50,000 people were enthused and wrought up to the highest pitch.

It was the eighth anniversary of the first international aviation meet, which was held at Belmont Park at the end of October, 1910. Then John Moissant and Grahame White raced to the Statue of Liberty for the $10,000 prize offered by Mr. Thomas Fortune Ryan through the Aero Club of America. The race to the Statue of Liberty on October 26 was for the trophy and Liberty Bond offered by the Aero Club of America to assist Mrs. Van Rensselaer in her great work of supplying aviation fields with athletic equipment, swimming pools, etc.

This race was only one of many events, but was the one event for which everybody waited impatiently. The different aviation fields had been grooming their pilots and machines for this event and as much practice and test took place as if the squadrons were preparing to bomb Berlin.

When the seven De Havilands started for the race, they disappeared like many darts, and the roar of the big Liberty twelve motors grew fainter and fainter, the excitement grew more and more intense, and the fifteen minutes and thirty-one seconds which it took the winner to make the trip of thirty-six miles appeared as many hours.

When the first two planes appeared the crowd roared in excitement and enthusiasm and army aviators hugged each other on discovering that the plane with the white arrow, piloted by Sergeant Frank Coombs, of Hazlehurst Field, was first and planes from Roosevelt Field were second and third. The names of the pilots were not announced.

The crowd had cheers for all. It certainly was an enthused crowd—and the only regret was that there were no Liberty Bonds to sell.

Then Sergeant Coombs and Lieutenant Breeze were rushed over to the official stand, to be received by the officials who included Mrs. Van Rensselaer, Colonel F. M. Davis, who represented General Kenly; Mrs. Henry A. Wise Wood, Mr. Alan R. Hawley, president of the Aero Club of America;

Henry Woodhouse, Augustus Post, Lieut. Colonel I. Jones, Walter Camp, Major Thomas Hitchcock, Major J. S. Phipps, Major John J. O'Connor, Surgeon Gen. M. O. Terry, of New York, Captain and Mrs. Wharton, Mrs. Clinton Gilbert and some of the military aviators, including Lieut. Earl Carroll.

Exactly eight years before Messrs. Hawley and Post had been received in exactly the same way on their arrival at Belmont Park on their return from the historic balloon trip from St. Louis to Canada, after having been lost for six days in the wilds of Canada, and John Moissant had been received the same way for winning the Liberty Race.

Mr. Hawley officially pronounced Sergeant Coombs the winner and Colonel Davis said something to him which doubled his pleasure.

Of the seven DeHaviland machines which took part in the race, four were made by the Standard Aircraft Corporation, two by the Dayton-Wright Co., and one by the Fisher Body Corp. The machine that finished first was a Standard machine. No. 2 was a Dayton-Wright machine.

The other events were run off perfectly except that Lieut. Meany, after easily winning from Louis Chevrolet a race in which automobile was hopelessly matched against aeroplane, spiralled suddenly when too near the ground in an attempt to land and bumped into old Mother Earth head on. One of the wings broke the force of the fall. Lieut. Meany climbed out and waved back an ambulance which clanged across the field. He said he was not hurt, which proved to be the case, and the plane was not damaged irreparably.

Plenty to See

Late arrivals missed an opportunity to have their hair raised. The gentleman who supplied this opportunity was Capt. Jacques Boyriven of the French Aviation Mission. Capt. Jacques suddenly bobbed up with the tiniest machine on the field, a bright red Nieuport, which compares with the Caproni about as a chipping sparrow with a condor. Its wing spread is less than thirty feet; the Caproni's about seventy-five. In action, guided by Boyriven, it is a flying minnow; that is, if anybody ever saw a bright red minnow. It darted hither and thither, up and down, like a demented bug, and these metaphors are no more tangled than the Nieuport threatened to be with the crowds of gasping spectators whom Capt. Jacques delighted to scare.

Every little while this tantalizing scarlet apparation disappeared behind the stands. Then, when the people felt safe once more, it came buzzing past the stands, the whole length of them, not more than twenty-five feet above the heads of the crowd on the lawns. It seemed to dive straight down at the crowd in front of the field stand, and then, just when they were bursting their shoe laces in a scramble to get away—Zoom! Up Capt. Jacques's red beetle shot toward the zenith. Twice it came winging between the field and grand stands, lower than their roofs. The second time it did this a man on the ground not more than twenty feet beneath the Nieuport tossed up his derby hat. Just by luck the hat missed being drawn into the propeller.

An encounter with even a small bird is dreaded by an aviator, the catastrophe that might be caused by collision with a shell-proof derby hat can be imagined. The Nieuport kept away from the crowds after that, and contented itself with skimming the inner field, darting straight at the old judge's stand and then, when everybody closed his eyes to shut out the smash, frisking upward and over the little building with a flirt of its saucy tail.

Captain Williams of the United States Army was meanwhile manœuvring in stately fashion in the big Caproni. The Nieuport cut disdainful circles around him. Altogether Captain Jacques and his zoological wonder, be it minnow, bug, flying flea or hoptoad, certainly enjoyed themselves on this pleasant afternoon.

Bombing is Demonstrated

Later the thousands of eager witnesses saw just how bombs are dropped at the front. There was a circle marked by four white flags near the middle of the infield. The planes flew over it and a smoke bomb dropped within the circle was a "hit." Two squadrons of aviators, in the machines actually used for this kind of warfare, competed, one machine of each squadron releasing the bombs while the others protected it from imaginary attackers. On hitting the ground the smoke bombs that were used exploded with a bright flash and a burst of smoke. There were eight of them and all seemed to strike within the circle.

At the same time rival teams were playing pushball, Roosevelt Field beating Mitchel Field and Lufbery Field beating Hazlehurst Field.

In the air and land race Louis Chevrolet drove the same Frontenac with which he won the Harkness trophy at Sheepshead Bay last year by making 110½ miles an hour for 100 miles. Lieutenant Meany, the airman in the race, piloted a Thomas-Morse plane with Le Rhone motor, the single-seated machine in which fighters are trained. Chevrolet had no chance anyway and dust on the track was ankle deep. Lieutenant Meany chivalrously held his mount back from time to time so that the little red automobile might run a dead heat, as in the good old circus chariot races. But after birdman and groundman had circled the 1½-mile track three times the biplane scudded home away ahead.

While blue and orange and crimson aeroplanes cavorted on high officers from Mitchel and Hazlehurst fields stripped to running clothes and had a relay race. They're in the army now, but not so long ago they were college headliners. For Hazlehurst there ran Captain Holden from Yale, Captain Babcock from Worcester Tech, Lieutenant Joy from Holy Cross and Lieutenant Billy Queal, once a professional runner and coach of the Yale cross-country team. For Mitchel Field the colors were carried by Stallenwerck from Johns Hopkins, Higgins from Cornell, Hinman from the University of Chicago and Fred Kelly from the University of Southern California, winner of the high hurdles event in the last Olympic Games and a famous sprinter as well. But Kelly was the last man to run for his team in the relay. His team was behind and he could not close the gap.

Motorcycle Relay Race

Ten of those motorcycles with side car attachments also had a relay race, two men to a machine, one piloting it, the other riding in the side car and plunging out of it and into the car ahead when the relay point was reached. Roosevelt won, Hazlehurst was second and Henry J. Damm Field third.

The stunters got busy overhead. A flock of little Thomas-Morse scouts flip-flopped through most of the loops, turns, falling leaves, barrel rolls, tail spins and various dives in the curriculum of the master aviator.

Fifty-three biplanes set hearts throbbing again when they rose for formation flying. Whole squadrons were exhibited in concerted stunts. The climax was superb. The whole fifty-three straightened out in the sky and descended at once. It looked as if they couldn't possibly do it within the Belmont Park enclosure, but they did. Within twenty seconds from the landing of the first machine the last one was motionless on the ground.

UNCONDITIONAL SURRENDER

"Sublimist word in English tongue
Is Duty," said the peerless Lee,
And Duty's bravest flag is flung
That all the world may yet be free.
Our Duty to our God and land
Was never so distinctly set,
There never was a chance so grand
To do so much without regret.
Then force the Vandals to their knees,
Remove the fangs that tear mankind,
Keep sending freemen o'er the seas
And strike the foul beast dumb and blind.
"Surrender Unconditional"
Is blazoned on our battle flag
No half way measure shall enthrall
The earth now free as mountain stag.
And untold millions raise the skies
In loud acclaim unto our Lord
That after all our sacrifice
The beaten foe must drop the sword.

—George L. Upshur.

Oct. 9th, 1918.

THE NEWS OF THE WEEK

One Thousand Officers and Twenty-five Thousand Men Wanted for the Balloon Service

One thousand officers and twenty-five thousand men are wanted for the balloon service. Application should be made to the Training Section, Balloon Branch, Bureau of Military Aeronautics, Washington, D. C.

The Balloon Service affords a splendid opportunity for front line service, not only for the officers, but also for the enlisted men, because the balloons are operated near the front line and every member of a balloon company is, therefore, near the front line.

Colonel A. L. Fuller, the head of the Balloon Service, and Colonel James Prentice, Major J. C. McCoy, Major Thomas S. Baldwin, Major A. B. Lambert, A. Leo Stevens, Major Max C. Fleischman and other pioneers in the balloon game are justly proud of the Balloon Service. It has done splendid work overseas under the able direction of Colonel Charles de F. Chandler, Colonel Frank P. Lahm, Colonel Ira Fravel, and the other able officers in charge of the Balloon Service overseas.

General Harbord Makes Air Flight

Paris.—Major-General James G. Harbord, head of the supply service of the American Expeditionary Forces, visited the aviation school on October 10. He made the trip with Colonel Kilner, chief of the school, in an aeroplane.

The two officers had met at the supply service center and during their talk General Harbord said that the proper way to visit an aviation school was to fly there. Half an hour later he left his headquarters in an aeroplane equipped with a Liberty motor and piloted by Colonel Kilner. At their arrival at the school, sixty miles away, they were met by Colonel Bingham, who is in command there. They inspected the camp and motored to nearby centers, the nature of which are not disclosed at present. After lunch they returned by aeroplane in time to finish the day's work. No one at the supply service headquarters knew the General had been away.

Fliers' Bombs Make Big Catches of Fish

Aviators training at Rockaway for the purpose of excavating a large part of the Kaiser's real estate holdings with high explosive bombs are aiding the residents of that section to get their food supply. Likewise, they are conserving fish worms, live frogs and fishermen's time.

Shortly after the new fort was established at Rockaway Point, the aviators began flying over the water and dropping explosive bombs guaranteed to put a submarine on the fritz, or to make a dent in any German town where they happened to fall.

Fishermen learned that when the bombs went off they killed large numbers of fish, so they geared up their motor boats and proceeded to wait at a safe distance until the practice bombs were fired. Then, when the column of spouting water told the story of a newly fired bomb, the boats were sent at top speed to the scene and all the fishermen had to do was haul in the catch.

The scheme was unfolded when two fishermen came into Freeport, L. I., with 600 pounds of fish that brought record prices. All were caught with an aviator's bomb.

Chaplains Take 'Plane to Mass

Paris.—Aeroplanes and tanks are being used by volunteer chaplains and field secretaries with the Knights of Columbus, to serve the American soldiers over here.

Two chaplains, the Rev. John Moran of Eugene, Ore., and the Rev. John Sullivan of Tuckahoe, N. Y., were the first priests to make their rounds by the air route. The Rev. Mr. Sullivan uses aeroplanes several times a week, and thus is able to visit field hospitals within a redius of 200 miles of his camp.

Aeroplane transportation was used by the Rev. Mr. Moran for the first time when he received two calls to say field masses one Sunday morning. The call came from villages fifty miles apart, where troops were billeted. An aviation pilot solved the problem for Chaplain Moran by offering to take him to both places, and he went. The result was a field mass at one village at 6 o'clock in the morning and another mass in the village fifty miles farther on at 7.30 A. M.

U. S. Aviators Maintain Night Patrol at Front

With the American Armies Northwest of Verdun—American aviators, by inaugurating night patrols along the Meuse, have attracted much attention among the airmen of other nations. Under the present plan the air forces are always subject to call from the front, where observers or listeners report by wire when the motor of a German aeroplane is heard approaching the American lines.

As soon as one of these reports is received the American searchlights begin sweeping the sky. The American night patrols arrive at the same time. In event the German machine is located by the ray of a searchlight the American machines attack until the enemy is downed or makes his escape.

Ensign Robert Stocker, son of Captain Stocker, U. S. N., and his observer ready to start out on patrol

Fliers to Drop Smokes to U. S. Prisoners

With the American Army in France.—Americans are planning to supply American airmen now prisoners in Germany with cigarettes by dropping packages over the enemy line at regular intervals, addressed to individuals known to be in the various camps.

A card has been received at aviation headquarters from Lieutenant Alan F. Winslow, of River Forest, Ill., asking the American airmen to send him cigarettes as soon as possible.

Signor Eugenio Chiesa, Secretary of Italian Aviation, getting ready to take a flight

Chicago Flier Downs Hun

With the American Army Northwest of Verdun.—Aviator Will Ervin, of Chicago, had a busy day Friday. Early in the morning he brought down a German aeroplane near Fleville. Later he participated in the all-American raid behind the German lines, acting as one of the scouts protecting the bombing machines.

Our Aviators Downed 261

With the American Army in France.—Between September 12, when the St. Mihiel drive began, and October 19 United States Army fliers brought down 261 German planes, which represented one-seventh of the total flying strength of the enemy from the Swiss border to the sea.

Sky Full of Aeroplanes

October 24 was marked by perhaps the most active aerial warfare we have seen. The sky was filled with machines all day. More than a hundred American bombing machines dropped several tons of bombs on German positions. The Germans retaliated with weak day bombing, but that night bombed the back areas of the American forces with vigor.

There were many air battles along the front. Four of our lieutenants—Woolsey, Manning, Humes, and Colson—met four Fokkers at a height of 3,800 metres. The Germans accepted the challenge, and in view of thousands of soldiers the four German machines were seen to come down. None of our airmen was hurt.

An idea of what our day bombers are doing may be gained by the statement that two tons of bombs were dropped on Buzancy to-day. Many fires were started in German depots.

Wounded Aviator Wants More Fight

Lieutenant Eddie Rickenbacker, the American flier who zoomed into fame through a series of daredevil flights over the German lines, is in a hospital in Paris suffering from an injury received in the cloud battle in which he downed his eighth Boche plane. Both of Rickenbacker's eardrums are split. Recent despatches mentioned the fact that the aviator had been injured, but failed to supply details.

Lieut. Frobisher Killed in Aerial Combat

Lieutenant J. Edwin Frobisher, Jr., of the American Aviation Section, died on September 10 of wounds received while he was in combat with a superior force of German aeroplanes. He was one of several American fliers who went aloft to drive off a squadron of German planes which had attacked the American lines. In the fighting which followed, and which ended in victory for the Americns, Lieutenant Frobisher was wounded. He was twenty-three years of age and a native of Arlington, N. J.

Best Day for Our Airmen

With the American Army Northwest of Verdun.—American bombing aviators on October 18 attacked Bayonville, Buzancy, Remonville, Briquenay, Verpel, Cery-Le-Grand, Aincreville, and Imecourt, each town being a German supply point or an army unit headquarters. They downed ten German machines.

Simultaneously with the bombing expedition two squadrons with small bombs and machine guns attacked German infantry along the roadways leading to Landreville and Landrestet-St. Georges.

The day is considered the most successful in the history of American military aviation.

Syllabus of Observer's Course

Washington.—Men of good education, sound judgment, quick perception and action and iron nerve are required by the United States Air Service for duty as aeroplane and balloon observers in France.

General Pershing recently called for an increased number of observers, and the War Department, on behalf of the Air Service, announced the qualifications necessary for the work, and what the supplementary courses of instruction will be after the candidate has been accepted. The different courses of instruction will cover about twenty-three weeks.

Civilians applying for work must undergo the same rigid physical examination as pilots. Accepted applicants are first sent to a ground school, where instruction on general military matters is given and work on wireless telegraphy, machine guns, and in the interpretation of aerial photography is begun. The course lasts eight or nine weeks.

From the ground school successful applicants are sent to one of the Schools of Fire—the Field Artillery at Fort Sill, Okla., or the Coast Artillery (heavy) at Fort Monroe, Va.

Completing the artillery course of seven weeks, the men will be sent to the observers' schools at Fort Sill or Langley Field. This course will cover about five weeks, but will fit the men for any duty required of observers.

To complete their training, just before sailing, the observers will be sent to Selfridge Field for a three-week course in aerial gunnery. No definite age limit has been fixed for observers.

Lieut. Winslow a Prisoner

It has been reported by the American Red Cross that Lieutenant Alan F. Winslow, American Air Service, France, is now a prisoner of war in Camp Lazarett, Germany.

Lieutenant Winslow achieved the honor of being the first American aviator with the A. E. F. to bring down an enemy plane, April 14, 1918, which action was immediately duplicated by Lieutenant Douglas Campbell, of Harvard University and California.

Until the recent report from the Red Cross Lieutenant Winslow was believed missing in action since July 31, after a fight in the air northeast of Fere en Tardenois. His father, W. H. Winslow, a munition manufacturer, of Chicago, Ill., has also been advised by the Red Cross in Paris that his son is a prisoner at Tier in Germany, where he is doing nicely, although his left arm has been amputated.

Confirmation of Lieutenant Winslow being a prisoner has also been received from his brother, Lieutenant Paul S. Winslow, American Air Service, London.

American Aviation Abroad

Hon. Franklin D. Roosevelt, Assistant Secretary of the Navy, who recently returned from a long tour of American naval bases and stations, to-day gave to the press the following review of United States naval activities abroad:

All the way from the Spanish border clear around to the English Channel we have established aviation stations so spaced that the entire coast line is covered by seaplanes and dirigibles. Nearly all these stations are located at out-of-the-way points, some placed on uninhabited islands, others in fishing vessels on peninsulas. Labor was almost impossible to get, so these stations were built almost entirely by our own sailors. At each station there is an average of from 200 to 300 men. This aviation force and our patrol vessels have been doing such splendid work that for the past six months there have been practically no sinkings within fifty miles of the French coast. We hope to extend this patrol zone to a hundred miles, so that the submarine will be driven still further out, increasing the difficulty in attacking vessels. We have on one of the lakes close to the coast a large aviation school for bombing practice and the general training of aviators. At one point we have an immense assembly and repair base which employs over five thousand men. An instance of the way in which every bit of material has been utilized was at this base, where, before the erection of permanent quarters, the men took the packing cases in which the planes were shipped and converted them into barracks which were very comfortable.

In northern France, in coöperation with the British and Belgians, we established what is known as the Northern Bombing Group, composed of a number of aviation units. This was organized originally for bombing the submarine bases on the Belgian coast. It was in active operation all summer and did much to prevent the use of Zeebrugge and Ostend by the Germans. After the British had blockaded the entrance to those harbors Germans were prevented from clearing the channel by the constant activity of these aviators, who daily and nightly dropped tons of explosives on the German submarine bases.

American Airmen in France

"Aerial Age" Editor Gets Distinguished Service Cross

Washington—The Commander in Chief of the American Expeditionary Forces has awarded the Distinguished Service Cross to the following officers for the acts of extraordinary heroism described after their names:

SECOND LIEUT R. E. DECASTRO, Air Service, 1st Aero Squadron, pilot.—For extraordinary heroism in action near St. Mihiel, on September 12th. Because of intense aerial activity on the opening day of the St. Mihiel offensive. Lieutenant Decastro, pilot, and First Lieutenant A. E. Esterbrook, observer, volunteered to fly over the enemy's lines on a photographic mission, without the usual protection of accompanying battle planes. Notwithstanding the low-hanging clouds, which necessitated operation at an altitude of only 400 meters, they penetrated four kilometers beyond the German lines. Attacked by four enemy machines, they fought their foes, completed their photographic mission, and returned safely.

FIRST LIEUTENANT A. E. ESTERBROOK, Air Service, observer, 1st Aero Squadron.—For extraordinary heroism in action near St. Mihiel on September 12th. Because of intense aerial activity on the opening day of the St. Mihiel offensive, Lieutenant Esterbrook, observer, and Second Lieutenant R. F. Decastro, pilot, volunteered to fly over the enemy's lines on a photographic mission, without the usual protection of accompanying battle planes. Notwithstanding the low-hanging clouds, which necessitated operation at an altitude of only 400 meters, they penetrated four kilometers beyond the German lines. Attacked by four enemy machines, they fought off their foes, completed their photographic mission. and returned safely. Home address, Major E. P Esterbrook, father, Fort Flager, Washington.

Lieutenant Decastro was previous to his joining the Air Service, Associate Editor of Aerial Age.

FIRST LIEUTENANT WILLIAM P. ERWIN, Air Service, Ist Squadron. For extraordinary heroism in action in the Chateau-Thierry and St. Mihiel salients, France. Lieutenant Erwin, with Second Lieutenant Byrne E. Baucom, observer, by a long period of faithful and heroic operations set an inspiring example of courage and devotion to duty to his entire squadron. Throughout the Chateau-Thierry actions in June and July he flew up under the worst weather conditions and successfully carried out his missions in the face of heavy odds. In the St. Mihiel sector September 12-15, he repeated his previous courageous work. He flew as low as fifty feet from the ground behind the enemy's lines, harassing German troops with machine-gun fire and subjecting himself to attack from ground batteries, machine guns and rifles. He twice drove off enemy planes which were attempting to destroy an American observation balloon. On September 12-13 he flew at extremely low altitudes and carried out infantry contact patrols successfully. Again on September 12th, he attacked a German battery, forced the crew to abandon it, shot off his horse a German officer who was trying to escape, drove the cannoneers to their dugouts, and kept them there until the infantry could come up and capture them.

120 American Planes Bomb Moving Troops

With the American Army, Northwest of Verdun (Associated Press).—American bombing aeroplanes and aerial machine gunners were busy on October 23rd in checking German troop movements towards the fighting front. At midday two squadrons of bombers attacked Buzancy with excellent results. Later about 120 machines attacked enemy troop concentrations in the woods in the region of Remonville.

Several formations of Fokkers attacked both groups of the American bombers, but were driven off in each instance.

Lieutenant Edward V. Rickenbacher was credited with one boche before breakfast.

Other reports of air victories continued to reach the officials all day. At least twelve German machines were brought down.

Lieutenant Sidney Grant of Orange, N. J., observer, and Lieutenant F. B. Foster of Boston, Mass., pilot reported two Boche machines as their morning's work, returning to thei own lines with twenty-three bullet holes in their wings as evidence of the fight.

Three Fly from Texas to Capital Despite Storms

After battling storms, heavy rains, and smoke from forest fires, three young army aviators are safe in Washington with the coveted honor of being the first men ever to fly from Texas to the national capital.

They flew the 1,700 miles in a total flying time of a trifle less than thirty hours, an average speed of about fifty-six and two-thirds miles an hour.

The holders of this new air record are Lieutenants W. P. Bancker, Jr., Z. P. Lee and C. M. Cone. Flying in two training planes, they left Ellington Field, Houston, Tex., on October 17, and from then until they "taxied" their planes safely on the ground of Washington they were almost constantly in bad weather.

Their longest single flight was from Indianapolis to Delaware, Ind., a distance of 170 miles, which they covered in exactly two hours. The longest day's flight was 350 miles, from Dexter, Mo., to Indianapolis.

While on the way up they aided local Liberty Loan committees in towns and cities in Texas, Arkansas, Missouri and Ohio, dropping Liberty Loan literature and attending patriotic rallies.

On October 22 they flew from Dayton, Ohio, to Washington, Pa., then, as Lieutenant Bancker said, "We flew from Washington to Washington." They landed at Bolling Field, Anacostia, at 6 o'clock on October 23.

"Our trip was uneventful except for bad weather," said one of the officers. "While on the way north from Memphis, Tenn., we ran into the smoke from those forest fires in Minnesota. This bothered us, so that we had to make a detour of about one hundred miles to avoid it.

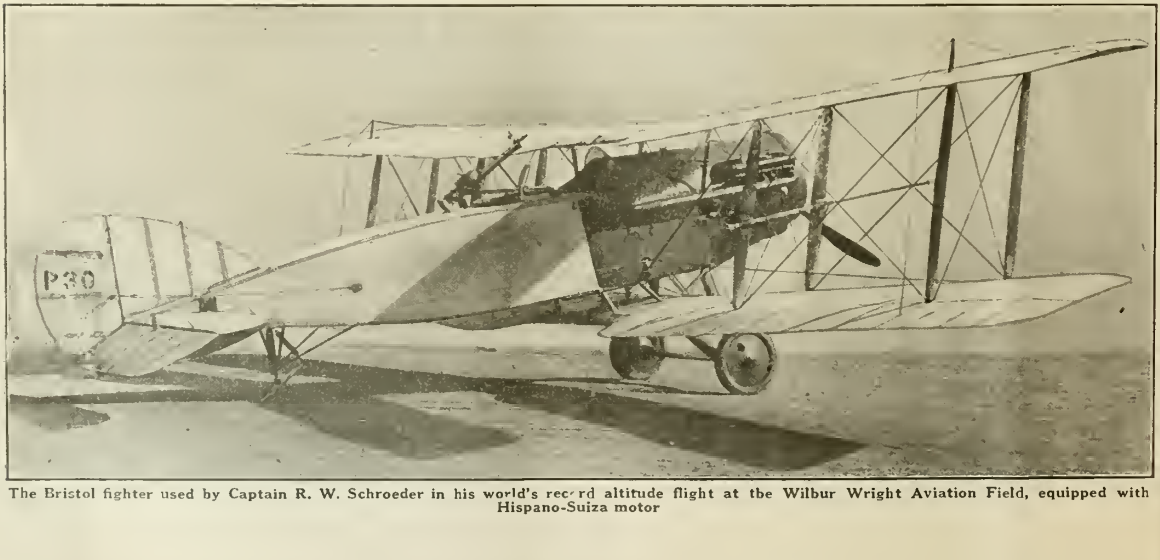
"On the way we stopped at six of the army flying fields.

"Our flight from Texas to this city proves beyond doubt that the training planes used by the army are capable of long, sustained flights under bad weather conditions."

Our Fliers Down 15 Planes

Washington.—Continued progress by the Americans on the battlefront north of Verdun was reported on October 24 by General Pershing.

Fifteen enemy aeroplanes and one observation balloon were shot down in the course of many combats, in which three American balloons were destroyed and six planes failed to return.



The Bristol fighter used by Captain R. W. Schroeder in his world's record altitude flight at the Wilbur Wright Aviation Field, equipped with Hispano-Suiza motor

Le Matin on Airnats

Le Matin, the leading daily journal in Paris, during the week commented on the new nickname for the men of the Air Service. It read in part:

"Airnats, a clear, nice and neat word. That is the surname adopted by the flying corps of the United States Army.

"This choice was made recently through a competition organized by the *Plane News* after a very laborious balloting.

"A prize of one hundred francs was to be given to the best choice of a name and there were several tempting titles on the list: Sky Jockies, Eagles, Larks, Skyscrapers, etc. Airnats, submitted by Swafford of the 665th Aero Squadron, had the majority of votes and was finally adopted.

"The word does not mean much by itself, being an abbreviation of Aeronauts, but it is really lively, and our friends intend that Kaiser Bill will soon hear about it at his expense.

"Airnats, Doughboys and Rednecks are all animated by a strong resolution: get plain victory, because they know that they must make the world a place where anyone can live."—*Plane News.*

7,000,000 Soldiers' Letters Distributed Rapidly in United States

More than 7,000,000 letters from American soldiers were received at Atlantic ports between July 29th and August 9th, and the Postoffice Department announces that every one of them was started for its destination within twenty-four hours after its arrival.

One ship, it is stated, brought 2,823,000 letters and another 300,000 on August 2, and a ship arriving August 5 brought 2,031,000.

Of all this mail, the department said, 80 per cent was sorted as to railroad routes in America before it left France.—*Plane News.*

More Boche Bow to Fonck

Lieut. Fonck, the French ace of aces, has scored two more air victories, which raises his total to 62. He has an unofficial total of 92 victories. The recent victories of the greatest of all aces was a double victory, he attacking two enemy planes, getting both.

Paint Iron Crosses Over Bullet Holes

American pilots in defiance of the Hun "lead" are painting small iron crosses over holes made in their wings by German bullets. Planes of some of the American aces are covered with the ugly black signs, however the crosses are greatly overshadowed by the radiant American insignias expressing the fliers' faith.—*Plane News.*

137 Aeros Felled by American Unit

With the American Army on the Lorraine Front.—"The American flying circus" is the nickname by which the most notable American aviation pursuit group will be known in the future, after having enhanced its record notably during the St. Mihiel offensive.

This group consisting of several pursuit squadrons, is the oldest in the service. It did inestimable work in the Marne fighting, and it may be said to have fully established its claim to the title by 34 clean-cut victories with minimum losses during the past ten days.

One hundred and thirty-seven officially confirmed victories had been credited to the group with seventeen more confirmations under way and perhaps twice as many victories achieved but not countable officially because of the strict American and French method of reckoning as victories only those planes and balloons seen to have been destroyed by witnesses other than the aviators taking part in their destruction.

D'Annunzio Wins High Decoration

Italian Headquarters in the Field.—King Victor Emmanuel on Sept. 20th presented to Major Gabriele d'Annunzio, as the head of the airmen who made the raid on Vienna, the high decoration of an officer of the military order of Savoy. A dozen British fliers on this front received the Italian silver medal for valor.

After the ceremony there was the largest review that has ever been held of the Italian Flying Corps; certainly one of the most striking spectacles seen anywhere since flights became practical. The pilots' skill and mastery of their machines were such that they played all sorts of tricks above and all around the royal party, which included the Prince of Wales, the Duke of Aosta, the Count of Turin, General Diaz and all the Italian General Staff.

From Resnati's Father

The youthful soldier of the United States of America, strong and beautiful, is today on the fields of glorious France rushing to victory, and today, in the name of human honor and liberty, he enters the glorious trenches of Italy, once more and forever vindicated.

Silvio Resnati, who is now dead, thus dreamed when alive.

Let us, sir, keep this alive within us, so that the end of the war may find Latin geniality bound to the bold, bounding, free energy of America—for thus he had often written me from that land which he loved as his second country. The soul of Silvio Resnati will exult in the mutual benefits, in the grandeur of our countries, and in the radiant triumph of a peace wrought from the love of humanity. He was not only a daring, yet modest, scientist of the air, but also a well-poised thinker, an uncompromising wisher for the intimate union of our two peoples.

You wished him well, both for himself and for the beautiful Italy which he was representing, just as he wished well all the American people, who intuitively understood him and felt that he was theirs, entirely theirs.

Say to your fellow-countrymen all the expressions of thanks which his mother, his sisters, his aviator brother, brave but unfortunate, which his father—all overwhelmed but infinitely proud—have not the words to utter, nor having could utter them.

DR. LUIGI RESNATI.

Milan, Aug. 13, 1918.—New York *Times.*

Emerson Field, a new Air Service flying field at Jackson, S. C., was opened on August 1. It is named in memory of Lieut. William Emerson, Field Artillery, who was the first artillery officer killed while serving with an American aero squadorn at the front.

The field, which was authorized on May 2, is to operate in conjunction with artillery, and for this purpose includes both aeroplanes and balloons. *Taylor Field Propeller.*

D'Annunzio Flies Across the Alps

Paris.—Gabriele d'Annunzio, the Italian author-aviator, landed in France on September 26 from an aeroplane in which he had flown from Italy across the Alps. He had flown 290 miles.

Capt. d'Annunzio left Turin at 9 o'clock on September 26 and arrived at Chalons, behind the French front, about noon. He made the passage of the Alps quickly, although the conditions among the mountain air currents were unfavorable. He used the same machine with which he had flown over Vienna last August dropping propaganda pamphlets, and the same pilot, Capt. Palli, guided the machine.

D'Annunzio, after landing at Chalons, joined Gen. Albricci, commanding the Italians on the French front.

Named for Downing Foes

With the American Army in France.—A large number of American aviators have received official credit for having brought down one German machine each.

Among them are Major Kenneth Marr of San Francisco, Lieut. Quentin Roosevelt of New York; Capt. Herbert Hall of Palo Alto, Cal.; Lieut. Alexander H. McLanahan of Philadelphia, E. X. Rucker of Fayette, Mo.; Waldon Heinrichs of Granville, O.; Tyler O. Bronson of New York City, Cleveland McDermott of Syracuse, N. Y.; Kenneth Porter of Dowagiac, Mich.; Robert C. Cates, Jr., of Spartansburg, Penn.; William E. Brotherton of Guthrie, Ill.; and Hamilton Coolidge of Boston.

Members of the National Advisory Committee on Aeronautics. From left to right: Messrs. John R. Freeman, C. E.; Charles F. Marvin, M. E.; S. W. Stratton, Sc.D.; Charles D. Walcott, Sc.D.; Rear Admiral D. W. Taylor, U. S. N.; Joseph S. Ames, Ph.S.; Lieutenant-Commander J. H. Towers, U. S. N.

Hon. Albert S. Burleson, Postmaster General
Hon. Otto Praeger, Second Assistant Postmaster General
Captain Benjamin B. Lipsner, Superintendent Aerial Mail Division

US
AERIAL MAIL

AERIAL MAIL PILOTS

- Max Miller
- Maurice A. Newton
- Robert Shank
- Ed. V. Gardner
- C. D. De Hart
- Louis Gertson
- R. Smith

George Langley Conner, Chief Clerk to Second Assistant Postmaster Praeger
Charles M. Kight, Special Representative
John A. Jordan, Special Representative
Frank Bowie, College Park, Md., Representative
Harry L. Hartung, Belmont Park, L. I., N. Y., Representative
H. Thomas, Bustleton, Penn., Representative

AERIAL MAIL MECHANICS

- Henry Wacker
- E. N. Angle
- A. F. Cryder
- Ed. C. Radel
- Wm. C. Read
- W. O. Beatty
- Chas. King
- J. A. Danville

Denver to Have Aerial Mail

The Postmaster General on October 21st in the following telegram to Senator John F. Shafroth of Colorado announced the decision of the department to extend the aerial mail service, after the war, to Denver:

"Referring to conferences with me relative to extension aerial mail service to Colorado points, I have directed the extension immediately after war of aerial mail service to Denver in connection with the transcontinental route from New York to San Francisco. I will take up matter of further extension of service in your state upon your return to Washington."

While the general extension of the aerial mail service, outside of the Washington-New York route now in operation and the New York-Chicago route to be inaugurated this winter, is being held in abeyance until the termination of the war, the Postmaster General is giving some time to the laying out of important trunk lines which will act as feeders to the chief east and west line that will run from New York to San Francisco. The telegram to Senator Shafroth announces the decision reached to extend the service into the State of Colorado, which has been discussed for some time between Senator Shafroth and the Postmaster General.

Aero Mail Pilot Eats Lunch En Route

William Dishler Warner, the inventor of the Warner Knee Control, has received an immensely interesting letter from Pilot Robert F. Shanle, of the New York-Philadelphia-Washington aero mail service. It follows:

"Mr. Charles King, chief mechanic of this field, equipped the planes I fly in the New York-Philadelphia-Washington air mail service with the 'Warner Knee Control.'

"The Warner control allows me the free use of both hands, and as schedule leaving time is twelve noon every day, I now take my lunch with me and eat it while en route.

"I consider the knee control a great advantage to cross-country fliers."

The French Aerial Mail

The Paris correspondent of the *Daily Telegraph* writes on August 18:

A postal service by air has been started for the first time in France between Paris and St. Nazaire, Aeroplanes, carrying mails, left Le Bourget Aerodrome, near Paris, shortly after ten, and one of the two machines, the other having had an accident, reached St. Nazaire at 8:30 p.m., after a stoppage at Le Mans.

SCHEDULE OF AEROPLANES. NEW YORK-WASHINGTON ROUTE AND CLOSE TRAIN CONNECTIONS THAT ARE BEING MADE

Leave New York 12.00 noon
Arrive Philadelphia 1.30 p. m.
Arrive Washington 3.30 p. m.

Tr. 7, Phila. & Read. R.R.—For post offices between Philadelphia and Williamsport, Pa.

Tr. 13-17, Atlantic City R.R.—For post offices between Camden and Atlantic City, N. J.

Tr. 463, N. Y., Phila. & Norf. R.R. and tr. 423 Penn. R.R.—For all post offices in Delaware.

Tr. 627, Penn. R.R.—For post offices between Philadelphia and Harrisburg, Pa.

Tr. 21, Penn. R.R.—For post offices in Pennsylvania west of Harrisburg, Pa., and for West and Southwest States

Trs. 1477-1279, West Jersey & Sea Shore R.R.—For post offices between Camden and Millville, N. J.

Tr. 1113, West Jersey & Sea Shore R.R.—For post offices between Camden and Cape May, N. J.

Tr. 4543, Penn. R.R.—For post offices between Philadelphia, Pa., and Perryville, Md.

Tr. 570, Phila. & Read. R.R.—For post offices between Philadelphia, Pa., and Boundbrook Junction, N. J.

Tr. 372, D. L. & W. R.R.—For post offices between Philadelphia and Stroudsburg, Pa.

Mails arriving at Washington by aeroplane at 3.30 p. m. will make connection with train 1, B. & O. R.R., leaving Washington at 4.00 p. m., serving post offices between Washington and St. Louis, Mo., and train 21, Southern R.R. for post offices between Washington and Harrisonburg, Va.

Leave Washington 11.30 a. m.
Arrive Philadelphia 1.30 p. m.
Arrive New York 3.30 p. m.

The same connections will be made at Philadelphia northbound as are described above for connection with the southbound aeroplane, and the following connections will be made at New York:

Tr. 26, N. Y., N. H. & H. R.R.—For post offices between New Haven, Conn., and Boston, Mass., leaving New York 5.11 p. m.

Tr. 19, N. Y. C. R.R.—For post offices in Vermont, Massachusetts, Northern New York, Canada and States west and northwest, leaving New York 5.31 p. m.

Tr. 288, N. Y., N. H. & H. R. R.—For post offices between New York and New Haven, Conn., leaving New York 5.30 p. m.

Tr. 183, Erie R.R.—For post offices between Jersey City, N. J., and Middletown, N. Y.

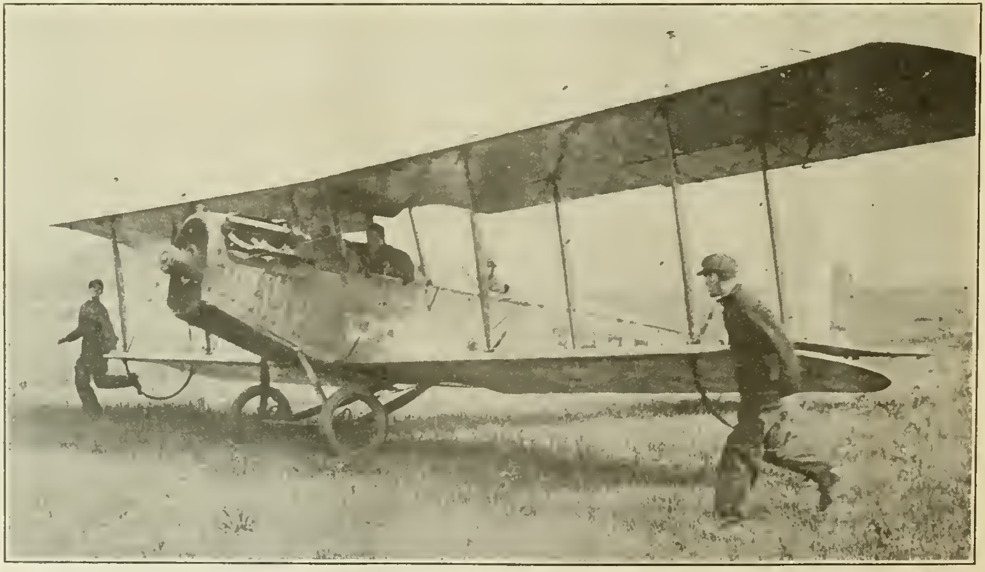
Tr. 26, Long Island R.R.—For post offices between Jamaica and Montauk, N. Y.

Tr. 214, Long Island R.R.—For post offices between Jamaica and Greenport, N. Y.

In order to make the connections at New York above enumerated by railroad, the mail would have to be despatched from Washington by Pennsylvania tr. 118, leaving at 11.00 a. m., arriving at Philadelphia at 2.20 p. m., and arriving at New York 4.45 p. m.

This schedule would also make the last afternoon delivery over the entire city of New York, while it would be necessary to despatch mail from Washington by train 114, leaving at 9.00 a. m., to make the same delivery.

THOMAS G. PATTEN, *Postmaster.*



The aero mail planes, which carried Douglas Fairbanks, the "movie" star, as first class mail matter, from Washington to New York. The result of the trip was that "Dougie" was able to sell several million dollars worth of Liberty Bonds

The AIRCRAFT TRADE REVIEW

Munitions Patent Board Established

For the purpose of co-ordinating the policies of the War Department and the Navy Department in patent matters, the Secretary of War and the Secretary of the Navy have established the Munitions Patent Board. The membership of this board consists of the Hon. Thomas Ewing, who has been jointly selected by the Secretary of War and the Secretary of the Navy; Max Thelen, the representative of the War Department, and Pickens Neagle, representing the Navy Department.

The Munitions Patent Board has been formed to consider clauses in contracts of the respective departments dealing with patents; questions as to the validity or infringement of patents and the patentability of inventions; questions as to the amount of compensation to be paid for patents or for the use of patents; and all other miscellaneous questions as to patents which may arise in the two departements interested. The board is empowered to recommend, from time to time, to the Secretary of War and the Secretary of the Navy, suitable action to be taken or policies to be adopted in regard to all patent matters which are brought before it for consideration. The action of the board in matters which come before it in so far as they apply to the War Department is subject to the final approval of the Secretary of War, and in matters for the Navy is subject to the final approval of the Secretary of the Navy.

Archibald Black Goes to Navy Department

Mr. Archibald Black, recently aeronautical engineer of the L-W-F Engineering Company, College Point, N. Y., has accepted an appointment as aeronautical engineer with the Bureau of Construction and Repair, Navy Department, Washington, D. C., and began his duties there October 21st, 1918.

Mr. Black was born in Scotland thirty years ago. After some years in the electrical line there he came to America, just at the time when flying was in its infancy. His interest in aviation dates back a decade and the optimism he has held for its future during these years has spurred him on to study and keep in close touch with the business.

After coming to this country, Mr. Black remained in his old line, working for the New York Edison Company, Detroit Edison Company and other electrical concerns. Early in 1916 he took a position in the engineering department of the Curtiss Aeroplane Company in Buffalo where he remained until coming with the L-W-F Engineering Company in August, 1916. Various L-W-F machines have been built under Mr. Black's direction, noteworthy among which was Model F in which was installed the first Liberty Motor to fly.

American Bronze Makes Changes

Berwyn, Pa.—The American Bronze Company has made a number of changes in its organization. Matthew C. Dittman, vice-president and treasurer, has been appointed general manager, and C. H. Baker, formerly auditor of the Timken Roller Bearing Company, Canton, will be his assistant. E. G. Anderson, sales manager, has been appointed advertising manager.

Detroit Priorities Office Opened

Detroit—A priorities section of the production division of the Army Ordinance has been established in Detroit under the direction of F. J. B. Sevald. Heretofore it was necessary for Michigan manufacturers to apply for priorities to Chicago.

Watson Heads Hispano-Suiza Section

Washington—John W. Watson, president of the American Bronze Company, Berwyn, Pa., has been appointed assistant chief of the Hispano-Suiza engine section of the Aircraft Production Board, of which B. D. Gray is chief. Mr. Watson will make his headquarters in New York.

Oakland Gets Bugatti Cylinder Order

Pontiac, Mich.—The Oakland Motor Car Company has been asked to supply the United States Government with cylinders for the Italian Bugatti 16-cylinder engine. Production on this contract is to start at once in the former Northway motor plant.

Limit Imports of Varnish Gums

Washington—Hereafter varnish gums can only be imported into the United States if they have been shipped from abroad prior to October 10th, 1918, if for use by the United States Government, if from Mexico or Canada, if as returned cargo from Europe or Mediterranean Africa when the loading can be done without delay, if Manila gum from the Philippine Islands and if Kauri gum not to exceed 3,000,000 lbs. for the present calendar year. Varnish gums other than the above are banned for importation.

License Pyrites from Spain

Washington—The War Trade Board will authorize licenses for the importation of 56,400 tons of pyrites from Spain for the remainder of the calendar year. Original regulations restricted imports of 125,000 tons up to October 1, 1918, but since licenses have not been issued for the full amount the Board has arranged to allow the 56,400 tons to enter during the last months of the year.

Sweeney Goes to Firestone

Detroit—J. B. Sweeney, formerly assistant advertising manager of the Paige-Detroit Motor Car Company, has joined the advertising department of the Firestone Tire & Rubber Company, Akron.

Personal Pars

S. V. Norton, manager of the truck tire sales of the B. F. Goodrich Company, Akron, is one of the several men to whom Gov. Cox of Ohio has assigned the task of working out a plan that will accelerate the development of motor truck transportation.

C. T. Schaefer, formerly chief engineer of the Globe Motor Truck Company, is now chief engineer of the Anvac Manufacturing Company, Anderson, Ind.

Castor Beans to be Threshed this Month

The 5,000 acres of castor beans planted by the Chamber of Commerce will be threshed the latter part of the month. Machines for the threshing are now in storage at the warehouse. Three machines will be attached to one engine. It has been impossible to estimate the crop. The drought has made it considerably less than was expected, but as some of the seeds were planted in irrigated land the total crop will be large.

When the total crop has been cut by the farmers it will be brought to San Antonio and threshed. It will then be sold to the Government at cost and the oil will be used to run aeroplanes.

The Chamber of Commerce accepted the Government contract for the castor beans and are doing the whole work on a patriotic basis without profit. Farmers under Government contract are given 50 cents per bushel in other parts of the country. The Chamber of Commerce took the contract for this portion of the country.

Leaflets from Plane

Workmen at Camp Meade were "bombed" by an aeroplane, 18,000 leaflets containing cheery messages being showered down upon them from a plane which left Bolling Field at 11:25 o'clock on October 24.

This was the first "bombing" plane sent out by the construction division of the army in its campaign to disseminate messages among workmen at the national cantonments.

The first plane was driven by Lieutenant E. B. Chandler. Lieutenant W. H. Lamprechter of the construction division threw down the messages.

"The quick finish of this job here will help Uncle Sam finish the kaiser over there," read one of the leaflets.

An interior view of part of the famous Pomilio aircraft factory in Italy

One of the many remarkable formation flights at the Belmont Park Aviation Carnival

LARGEST FORMATION FLIGHT AT MARCH FIELD

IRREFUTABLE proof that America has taken her rightful place in aviation was demonstrated to the people of Los Angeles and Southern California Saturday, October 12th, when 103 American-made aeroplanes, piloted by officers and cadets from March Field, flying in battle formation, the largest aero fleet ever to have been assembled in one flight in this country, bombed that neighboring city with Liberty Loan literature.

With Major John C. P. Bartholf, J.M.A., Commanding Officer of March Field at the peak; Major Ernest Clark on the right wing and Capt. Wm. Alden Smith, Jr., on the left wing, this gigantic formation taxied off, circled the course, assembled in ten separate and distinct units and finally headed in one solid formation for Los Angeles, 60 miles distant. The one hundred three (103) planes got into the air in a period of six minutes. The course followed the Foothill Boulevard, the planes maintaining an altitude of from 3,000 to 6,000 feet. Landing was made at El Segundo, just 78 minutes after leaving March Field.

The Arcadia Balloon School was advised by wireless of the approaching squadron and two ships were sent out to escort the formation over the city. A realistic battle-front feature of the flight was accomplished when this gigantic air fleet passed over the balloon school, seven huge observation balloons having been in the air at the time. The planes at this point were traveling at about the level of the Mount Wilson Observatory.

While thousands of persons craned their necks to get a glimpse of this great American armada the planes suddenly swept down from the mountain peaks giving Los Angeles a realistic imitation of a real air raid. Bombs were dropped and from them fell leaflets saying: "What if we were Germans? Buy Liberty Bonds." Copies of the camp newspaper, *The March Field Fly Leaf*, were also dropped from the planes.

Accompanying the air fleet was a hospital ship with Capt. M. Bannister, flight surgeon, as the passenger. Still another plane carried an official photographer, representing the Ince studios of Los Angeles. Moving pictures of the entire trip were taken both from the ground and en route. The films are to be sent to Washington.

All of the planes on this remarkable flight were of the Curtiss JN-4D training type. The ships returned in formations of 10, several of the units returning to March Field by more distant routes after visiting numerous Southern California towns and cities in the interest of the Liberty Loan.

Never before has such a flight been attempted in this country. Previous to this great air adventure the largest number of planes visiting an American city was 68, when in formation under the command of Lieut. Col. C. K. Rhinehardt, J.M.A., members of the First Provisional Wing of the American Air Service, flew over New York City. The more credit, however, is due the March Field squadron in that half of the pilots participating in this remarkable journey were cadets, pilots in training, while the remaining pilots other than unit leaders, were for the most part flying officers who have been commissioned at this field since July.

With but one exception, all of the planes to leave March Field returned on scheduled time, this feat in itself being a remarkable record, the entire trip devoid of accidents. Lieut. Ralph Watson made a forced landing in the outskirts of Los Angeles when his motor "froze" in the air. He landed in a beet field at Sixtieth and Budlong Streets. No damage.

Particular credit is due the Engineering Department on account of the fact that thirty of the ships were using motors which had had more than one hundred hours' service in the air since their last overhaul.

The highest commendation is due Major Bartholf, Commanding Officer; Major Eglin and Major Clark, officers in charge of flying; Capt. Wm. Alden Smith, Jr., Adjutant, and the numerous lieutenants who acted as unit leaders, as well as each individual pilot who made possible this air journey without a mishap to aviators or machines.

Major Bartholf summarized the significance of the achievement in his message of thanks to his command, which read as follows:

Memorandum: To All Concerned:

The Commanding Officer desires to express to the entire personnel of this Command, his appreciation of the very high degree of efficiency and entire cooperation which made possible

(*Continued on page* 421)

RADICAL INCREASE IN BALLOON CORPS

Veteran Balloonists and Observers to Help Colonel Fuller Organize and Instruct New Units

According to recent orders the balloon corps is to be immediately increased to approximately four times its original size.

The American balloon companies have rendered unusually efficient service in France and there is a constantly increasing demand for observation balloons.

Veterans of the Balloon Corps who will help organize the unit for the increase. Left to right: Mr. Frank P. Lahm, Major J. C. McCoy, Colonel A. L. Fulton, Major Harry R. Vaughn, Colonel James Prentice, Major E. Lazaire, Colonel H. B. Hersey

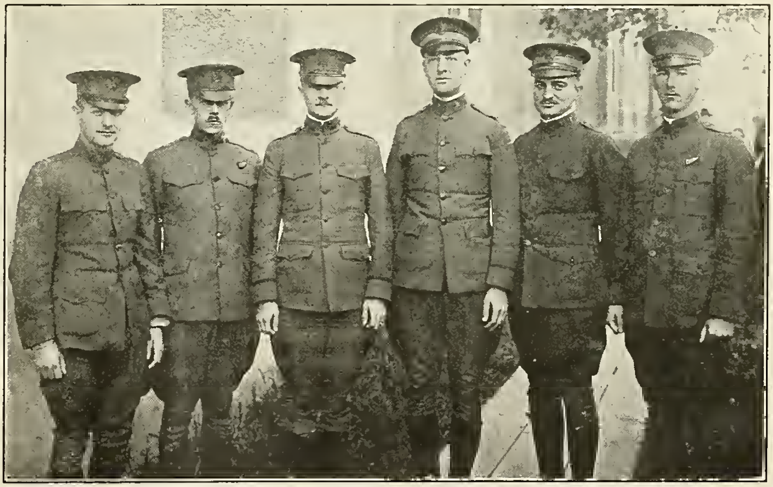
The original allowance of balloon troops is nearly all serving abroad, leaving only a small percentage of the old staff of experts available for training the new officers and soldiers.

The balloon training service has been placed under the supervision of Colonel A. L. Fuller, originally of the Coast Artillery Corps, who was the founder of the mechanics' school and the Ground Officers' School at Kelly Field.

In the Washington office he will be assisted by Majors R. S. Bamberger, E. Lazar and J. C. McCoy, also by Mr. Frank P. Lahm, the veteran balloonist. In addition the following younger graduates of the balloon schools will assist:

Captain C. E. Smythe, Captain A. Grimm, 1st Lieut. C. J. Schiller, 1st Lieut. W. D. Simpson, 1st Lieut. C. W. Merrell, 1st Lieut. R. S. McCullough.

Colonel J. Prentice, pioneer observer, who has recently recovered from a serious balloon accident of a year ago, is temporarily on duty at Washington. Lieut. Colonel H. B. Hersey and Major Harry R. Vaughn, have also been temporarily in Washington for consultation.



Younger officers of the Balloon Staff now in Washington. From left to right: First Lieutenant C. W. Merrell, First Lieutenant R. S. McCullough, Captain C. E. Smythe, Captain A. Grim, First Lieutenant C. J. Schiller and First Lieutenant W. D. Simpson

In order to fill the great number of vacancies created for officers, authority has been granted to transfer from the other branches of the army and to induct draftees. It will be necessary to enlist about twenty-five thousand soldiers. Induction of men subject to the draft has been authorized.

The balloon service can use a great variety of skilled tradesmen. Automobile, rope, rubber fabric and telephone experts are the most urgently needed.

Opportunities to rise from the ranks are as good, if not better, in the balloon corps than in any other branch of the service.

Persons interested in the balloon service should promptly visit or address the aviation boards whose addresses are as follows:

Boston, Mass.—739 Boylston St.
Canal Zone—Fort Sherman.
Chicago, Ill.—230 East Ohio St.
Dallas, Texas—Camp Dick.
Fort Sill, Okla.—Post Field.
New York City—104 Broad St.
Columbia, S. C.—Camp Jackson.
Yaphank, L. I., N. Y.—Camp Upton.
Little Rock, Ark.—Camp Pike.
Atlanta, Ga.—Georgia School of Technology.
Los Angeles, Calif.—Marsh Strong Bldg.
Minneapolis, Minn.—University of Minnesota.
Des Moines, Iowa—Camp Dodge.
St. Louis, Mo.—525 So. Euclid Ave.
San Francisco, Calif.—55 New Montgomery St.
San Antonio, Texas—Fort Sam Houston.
Washington, D. C.—Bldg. D, 6th and Missouri Ave.

(*Continued from page* 420)

the flight on Saturday, October 12th on such a comprehensive scale, and which allowed this flight to be characterized by absolutely unqualified success.

Any field might put a limited number of picked planes and pilots in the air for a special performance and make a creditable showing; but this cannot necessarily mean an efficient organization.

On the other hand a school that can put one hundred three (103)*—aeroplanes, eighty-five* (85%)*—per cent of its entire plane equipment, in accurate formation, piloted in large part by cadets who have not yet completed their training, throughout a flight of one hundred and sixty* (160) *miles, including a stop for gas, and absolutely without damage to any plane, must necessarily have an efficient organization and efficient personnel throughout every department.*

A closer inspection of the circumstances attending this flight show: the depleted condition of all squadrons, the fact that this flight was made without any interference of the regular training duties, the fact that twenty (20%) *per cent of the aeroplane equipment was second hand and received in unserviceable condition, the total flying time of approximately* 20,000 *hours without a fatality and without the loss of a single ship from the total received at this field; all of which make this performance all the more remarkable and a performance of which every member of this command may feel justly proud as a record that has never been equaled at any of the forty flying fields in the United States.*

John C. P. Bartholf,
Major, J.M.A., A.S., M.A., Commanding.

PREPARING THE PILOT FOR BATTLE ACROBACY OR TRICK FLYING

The Chassé Flyer Must Master Every Rudiment Before Being Fit to Combat With Enemy

By K. G. PULLIAM, Jr.

Captain, J. M. A., S. C., U. S. A.

(*NOTE.—The article printed herewith was written at the request and by authority of Air Service Headquarters, A. E. F., and is considered probably the most complete and comprehensive treatise on acrobacy yet published.*)

ACROBACY or trick flying is as necessary to the fighter of the air as a knowledge of his gun mechanism is to the infantryman. Consequently such trick flying has been found necessary to prepare a flyer for combat is now taught in the training schools.

It is extremely necessary that every chasse pilot master the rudiments of acrobacy before he tries air combat, for in such combat he must necessarily forget that he is flying and must devote every faculty to keeping out of the line of fire of his adversary. In thus dodging his enemy's attack the pilot puts his machine into positions which, due to inexperience, result in a vrille or in an upside-down position, and unless he has been taught how to avoid such positions he places himself open to being shot down by his adversary.

The object of acrobacy is to produce each dangerous condition of flight that a pilot may be expected to encounter and to teach how to meet them. Only in this way is it possible for a pilot to become the master of his machine. Thus in a short period devoted to intentional acrobacy a pilot acquires the confidence in his ability to meet all emergencies that no amount of ordinary flying can produce, and as a result he finds it possible to devote his entire time to his work of warfare, the function of piloting being performed instinctively.

At a field where trick flying is taught every student is given individual attention and instruction. Only one "stunt" at a time is explained, which must be repeated by the student, and unless every movement is thoroughly understood he is not permitted to attempt the work.

The Vrille

And so many accidents are attributed to the vrille and since it is considered the most disconcerting of all stunts it is the first to be taught. Any badly executed stunt or loss of speed may result in the machine doing a skid or a wing slip with probably a resultant vrille.

In starting the pilot ascends to at least 1,200 metres and after flying level for several minutes throttles his motor and just at the point where the machine stalls he pulls the control stick quickly back toward him and at the same time to the side, accompanying it by a sudden push of the rudder bar, using the foot corresponding to the side on which the stick is placed.

As a result the machine shoots suddenly up, losing speed, and falls sharply over to the side with a twisting corkscrew-like movement. In every case the twist commences sharply and the student is instructed to place his controls in neutral after the machine has made several turns and to *slowly* push the control stick forward a few inches. The machine ceases its whirl, points forward and dives straight down, the pilot at once redressing his control stick and bringing his machine again to horizontal flight, at the same time switching on the motor.

The pupil is instructed in both right and left hand vrilles, the instructor watching closely every movement made, and when the pilot lands he is told the mistakes he has made.

A vrille can be made with controls deliberately crossed, i. e., right hand rudder with stick to left or left rudder and right hand stick. The effect is the same, though somewhat harder on the machine, as the spin is not so quick and a twisting movement is produced in the fuselage. This crossing of controls is not encouraged, as in recovery the motions are opposite and likely to cause confusion, frequently the pilot redressing too much with the result that the machine goes into a spin on the opposite side.

The Renversement

Although the use of the renversement in actual combat is questionable, it is nevertheless very necessary that the student thoroughly acquaint himself with this stunt, as any pilot who is familiar with the movements of the renversement will be able to control his machine whether or not he is in an upside-down position.

To perform the renversement the pilot ascends to the height of 1,200 metres, flies for a few minutes, then points the machine *very* slightly downward so as to bring the speed up to maximum, pulls the control stick back sufficient to raise the nose of the machine to an angle of 20 or 30 degrees. If a left hand renversement is desired the rudder should be pushed hard to the left. As a result of the above control motions the nose of the machine jerks sharply upward, followed by a roll of the entire machine to the left. Just before the machine is completely on its back the motor is cut and the pilot places his controls in neutral; the plane stops its roll and the pilot pulls back on the control stick, causing the machine to dive and almost at once resume the horizontal, at which time the motor is switched on, the stick placed in neutral and normal flight resumed.

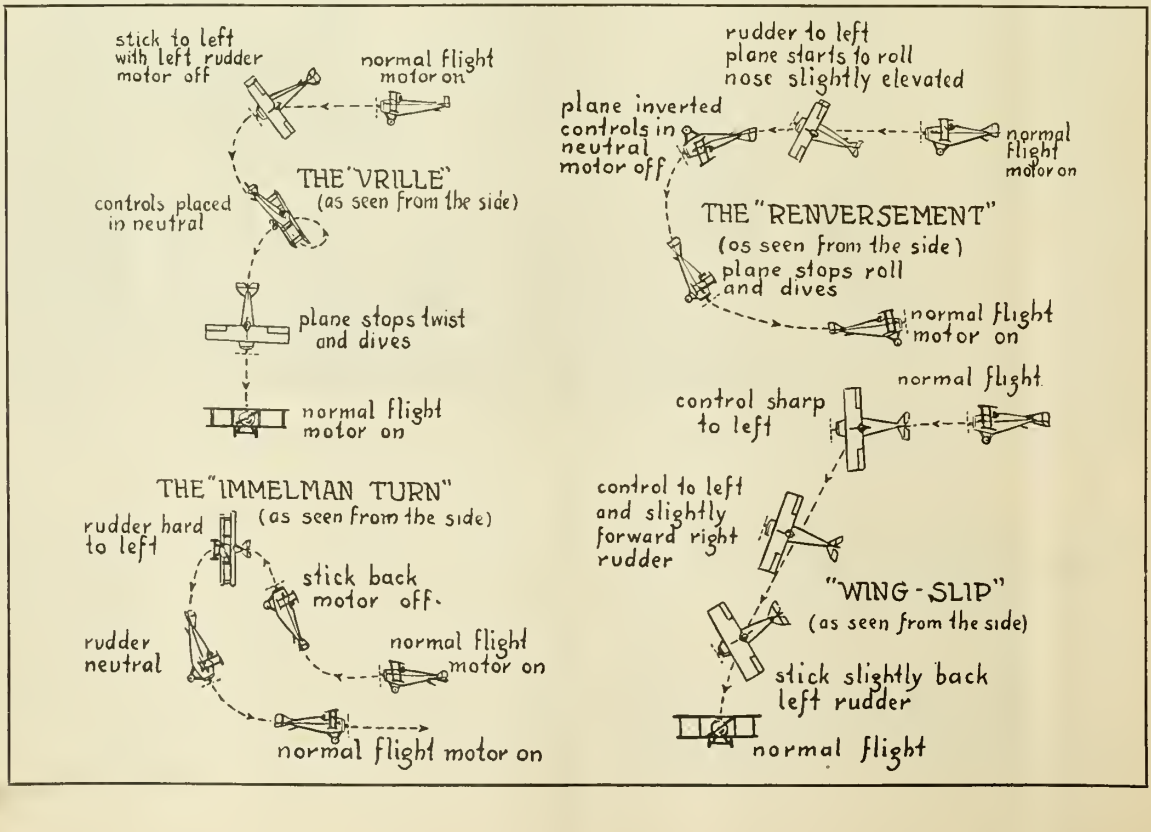
Since the pupil being unfamiliar with the head-down position in which he hangs when the machine is on its back, is not likely to recognize the moment at which the controls should be placed in neutral, he is instructed to immediately neutralize the rudder after he has thrust the control to the left.

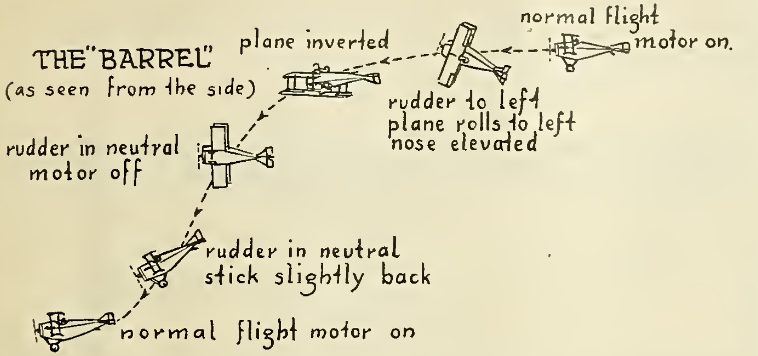
The renversement can be made to the right as well as to the left by use of right rudder instead of left, as described above.

The Immelman Turn

The Immelman Turn was first used in combat by Lieutenant Immelman of the German Flying Corps and has proved very useful as one of the fighting pilot's bag of tricks.

To perform the Immelman Turn the pilot again ascends to the height of 1,200 metres and after flying level for a few minutes he points the nose of the machine down very slightly and then pulls slowly back on the control stick, causing the machine to climb almost vertically. Care should be taken not to pull enough on the stick to cause





the plane to loop. The motor should be cut as soon as the machine starts to climb and as soon as excessive loss of speed is felt the rudder is pushed sharply to one side. The machine falls to the side on which the rudder is pushed and as soon as the machine reaches vertical the pilot places the rudder in neutral, switches on the motor and by pulling back on the stick resumes normal flight. A slight movement of the stick to the side corresponding to the rudder used will help the movement.

When done properly the turn is a very pretty performance and no loss of altitude results. It can be performed to either side with uniform results and after the pilot is thoroughly accustomed to the movement he may use his motor throughout the complete evolution with no loss of speed.

The Barrel

The Barrel might also be called a horizontal vrille and it is performed exactly the same as a renversement, with the exception that the controls are not placed in neutral when the machine is upside-down, but just before the machine again reaches normal line of flight. The first movements of the machine is identically the same as when in a renversement, but the roll continues until the plane has made one roll of 360 degrees, at which time the motor is switched on and normal flight resumed.

The Vertical Virage

The Vertical Virage is nothing more or less than a turn in which the plane is banked until the wings are perpendicular to the ground and the elevators are used for turning. It is used to turn quickly into the opposite direction without loss of either speed or altitude.

Flying level at full speed the necessity to turn suddenly is met by throwing the control stick to the side on which the turn is desired and accompanying it with a little corresponding rudder. When the position is reached in which the wings are perpendicular to the ground the stick should be placed in neutral and pulled hard back. The movement should be accompanied by opposite rudder sufficient to keep the nose of the machine from falling.

As a result of the above movements the machine banks sharply and as the stick is pulled back it seems to spin around, using the tip of the low wing as a pivot. As soon as the desired amount of turn has been made the pilot places his stick to the opposite side from which the machine is banked and the plane levels out and resumes normal flight.

The Side-Slip

Since the Side-Slip allows the pilot to lose an abnormal amount of altitude in proportion to the distance progressed forward, it is a very useful stunt. A pilot in making a forced landing may allow himself to overshoot his landing field and then side-slip off any surplus altitude, thus assuring his reaching the field.

In aerial combat and in dodging anti-aircraft fire it is also very useful, as it is a method of losing altitude very rapidly, and since in a side-slip the direction of motion is not directly forward it is very disconcerting to an enemy firing at the machine.

A side-slip is accomplished by pushing the control stick all the way to one side and accompanying it by sufficient pressure of the opposite foot to hold the nose of the machine up. The control stick is at the same time pushed slightly forward and the machine descends sidewise at a terrific speed.

To recover from a side-slip the control stick is placed in neutral and the rudder corresponding to the direction of the slip is pushed. As a result the machine turns and dives into the direction of the slip and by redressing the stick straight-away flight is resumed.

The Vrille Turn

The Vrille-Turn is very similar to the renversement, but, unlike the latter, it is very useful in air combat. It is performed with full motor and is a very rapid evolution.

The stick is pulled quickly all the way back and completely to the side, accompanied by a sharp kick of the rudder to the left. As a result the nose of the machine jerks up and the plane rolls to the left.

The rudder is immediately placed in neutral and the stick is brought back to the centre but held completely redressed. The neutralizing of the rudder stops the roll and as the stick is held completely redressed the nose of the machine immediately climbs to level and normal flight is resumed. No loss of altitude results.

As the motor is used throughout the turn the motions are necessarily very rapid and rather disconcerting when first attempted, but the pupil soon becomes accustomed to the rapidity of the twist.

The Loop

The Loop is accomplished by putting the nose of the machine down slightly to obtain maximum speed and then pulling back on the control stick, slowly at first and more rapidly as the top of the loop is reached. Just after the top has been passed the motor should be cut, the machine being allowed to fall of its own momentum through the last half. When the loop is completed the stick should be placed in neutral, the motor switched on and normal flight resumed. When looping with a plane using a rotary motor some left rudder should be used at the top of the loop to prevent falling out of the loop to the right.

A loop improperly done may result in a vrille, and taken as a whole looping is of no value in a fight, for when a machine is inverted the pilot is quite helpless until the machine has passed the "dead point" and starts downward, thus giving an enemy who is following a good target. The machine gun belt is likely to become disarranged and cause the gun to jam.

If the loop is improperly done the reversals of pressure are very severe and are extremely hard on a finely adjusted and very fast machine, but a loop properly done causes very little strain.

The Tail-Slide

A real Tail-Slide should not be accomplished with a machine using either ailerons or wing flaps for lateral control, because when it is properly done the reversal of pressure may cause them to buckle.

A tail-slide should never be attempted by even the most experienced of pilots unless he has an especially built exhibition plane, preferably a monoplane, which is equipped with warping wings and is constructed strong enough to withstand the tremendous reversal of pressure.

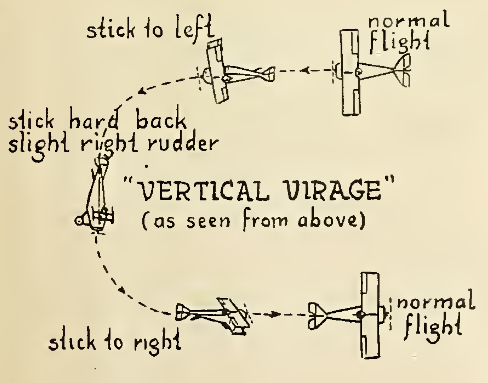
A stall accompanied by a slight drop of the tail, followed by a slipping off to the side into a vrille, cannot be called a tail-slide, for a well performed tail-slide will extend for at least 300 metres.

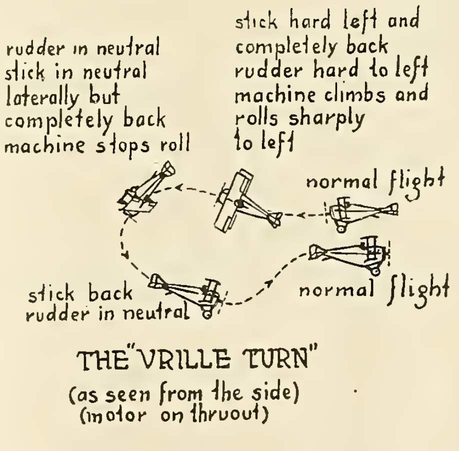
The Time and Place for Acrobacy

Acrobacy at low altitudes is strictly forbidden at training schools and it should never be done close to the earth except in cases of emergency and actual combat.

A pilot cannot at all times be sure of the condition of the atmosphere which he cannot see and fatal falls often result when overconfidence meets with bad air conditions near the ground.

The number of expert flyers who have met their death in this manner should be a sufficient and convincing argument to any pupil in acrobacy that stunting near the ground is a game that is "not worth the candle."





THE LONDON ENEMY AIRCRAFT EXHIBIT

The Fokker Single Seater Biplane—Type D7

By G. DOUGLAS WARDROP

The British number of the machine is B/2B/14, and the German number is Type D7 F.N. 1,450; maker's No. 2,455.

It was brought down north of Hazebrouck on June 6th, 1918, by a British SE.52, and is a single-seater fighter.

The principal dimensions are as follows:—

Span	29 ft. 3½ ins.
Chord (upper wing)	5 ft. 2½ ins.
Chord (lower wing)	3 ft. 11¼ inc.
Overall length	22 ft. 11½ ins.
Gap	4 ft. 2 ins.
Area of upper wings (with ailerons)	140.7 sq. ft.
Area of lower wings	78.3 sq. ft.
Area of Aileron (one only)	5.7 sq. ft.
Area of aileron (one only)	5.7 sq. ft.
Area of balance of Aileron	.5 sq. ft.
Area of borizontal tail plane	21.1 sq. ft.
Area of elevators	15.2 sq. ft.
Area of halance of elevator	1.1 sq. ft.
Area of fin	2.8 sq. ft.
Area of rudder	5.9 sq. ft.
Horizontal area of body	35.6 sq. ft.
Vertical area of body	58.6 sq. ft.
Area of plane between wheels	12.4 sq. ft.

This aeroplane presents features of very great interest, whether viewed from the standpoint of aerodynamic design or of actual construction. The machine which has been tbe subject of investigation was, unfortunately, rather extensively damaged, thus making absolute accuracy of description difficult, and trials of performance impossible.

A similar machine, however, has been tested for performance by the French authorities, who have issued the following report:

Altitude metres	Time of climb	Speed at this height
1000 (3281 ft.)	4 mins. 15 secs.	116.6 m.p.h.
2000 (6562 ft.)	8 mins. 18 secs.	114.1 m.p.h.
3000 (9843 ft.)	13 mins. 49 secs.	109.7 m.p.h.
4000 (13124 ft.)	22 mins. 48 secs.	103.5 m.p.h.
5000 (16405 ft.)	38 mins. 5 secs.	94.9 m.p.h.

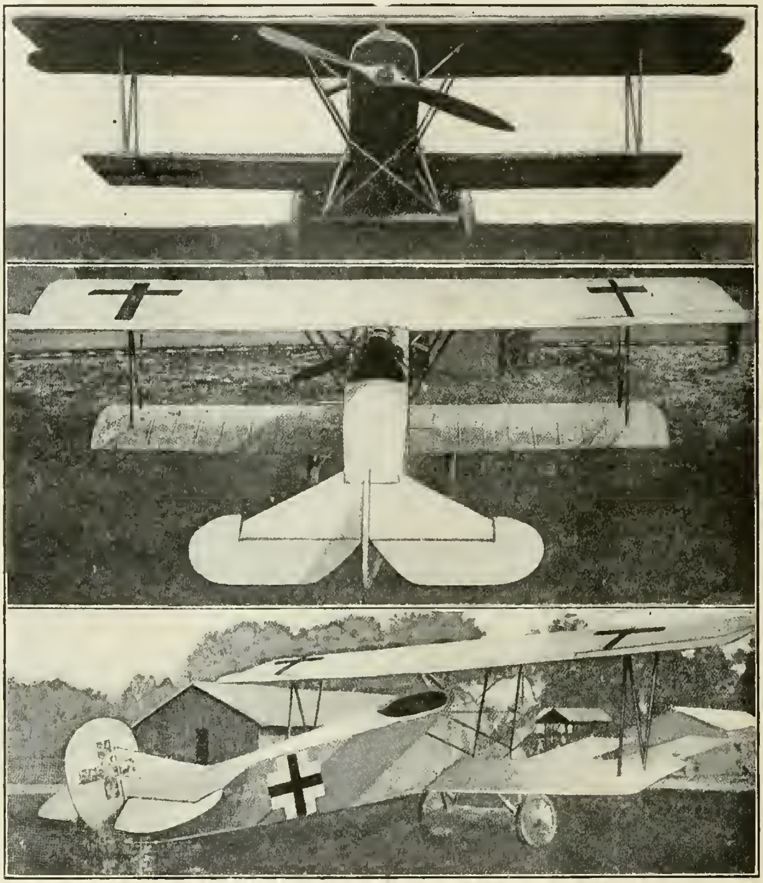
There are many points in which there is distinct divergence from accepted German, and tendency towards British, practice. The undercarriage, position of radiator and aileron control levers, or kingposts, are examples.

This fact is some indication that the designer of this machine has approached the various problems and compromises which confront one who sets out to create such a machine, with a quite open mind, and, if this be allowed, there is a very strong case for a thorough investigation of those features which are in contradiction to contemporary British practice. These points include the wing design, which is without any external bracing, but of especially deep section; the steel-tubular fuselage, and the peculiar bracing of this member.

There is nothing to prevent the adoption of the first and last features; hut it sbould be pointed out with regard to the steel work that experienced welders have expressed the opinion that this art has heen developed by the enemy to a high dgree of efficiency. Indeed, the welding is sufficiently good to give rise to the belief that new methods, involving radical changes, have heen adopted.

*The following data regarding weights is taken from a French source:—

Weight of fuselage, complete with engine, etc.	1,322.2 lbs.
Weight of upper wing with ailerons	167.2 lhs.
Weight of lower wing	99.0 lbs.
Weight of fin and rudder	6.6 lhs.
Weight of fixed tail plane	17.6 lbs.
Weight of clevators	9.9 lbs.
	1,622.5 lbs.



Three views of the Fokker Single Seater

*The schedule of principal weights given on page 1204 is the result of weighing the actual components mentioned, whicb were taken from the aeroplane allotted G/2B/14.

A different French report gives the following figures, which are taken from inscriptions found on one of the Spandau guns on a captured Fokker of the same type:—

Weight, empty	1,540 lbs.
Permissible load (useful load and fuel)	396 lbs.

Wings

As in the Fokker triplane, the extreme depth of wing section and the absence of external bracing are distinctive features. Both upper and lower wings are without dihedral, and are in one piece. The way in which the lower wings are fitted into their place is described in detail under the heading "Fuselage." Both upper and lower chords are set parallel to the cranksharf, i.e., at no angle of incidence, and tbe description "Angle of incidence, o°" is painted on the upper plane.

Wing Construction

In sharp contradistinction to the fuselage, which is constructed of steel even including memhers where wood is almost universally used, the wings contain no metal parts, if we exclude strut fittings and other extraneous features. There are no steel compression members, but where the internal wiring lugs occur, special box-form compression ribs are fixed. The leading edge is of very thin three-ply, which has a deeply serrated edge, finishing on the main spar. The ribs are of three-ply, and are not lightened, although holes are, of course, cut where necessary, to accommodate the control and bracing wires. A rib from the top center section, and one from the root of the lower wing, are both drawn to scale. See Fig. 1.

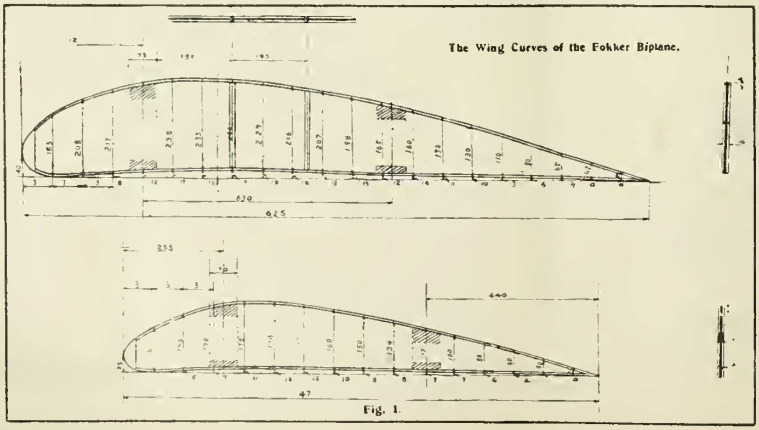
The extreme thinness of the three-ply has given rise to a new method of fixing the flanges on the ribs. Instead of grooved flanges tacked on so that the tacks run down the lengtb of the three-ply, two half flanges of approximately square section are tacked together horizontally with the ply sandwiched between. See Fig. 2.

Spars

As may be seen from the various sections drawn to scale in Figs. 3 and 4, the spars are made up of fairly narrow flanges at top and hottom, joined on either side by tbin three-ply webs. They are placed approximately 30 cms. apart. The flanges are made of Scots pine, and consist of two laminations. The three-ply has the two outer layers of birch and an inner ply which is probably birch also.

The three-ply webs are tacked on to the flanges, and fabric is glued over the joint. The cement is an ordinary gelatine glue.

The spar webs are glued to the flanges by a



The Wing Curves of the Fokker Biplane.

Fig. 1.

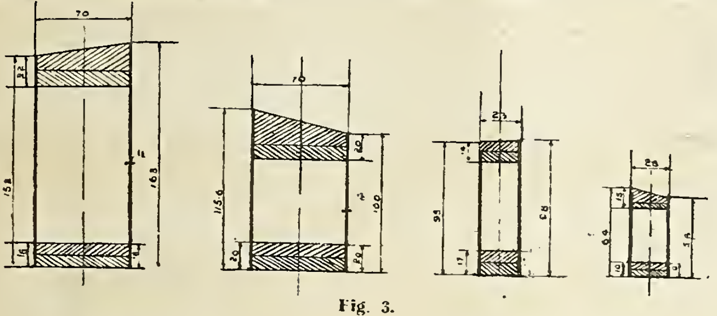


Fig. 3.

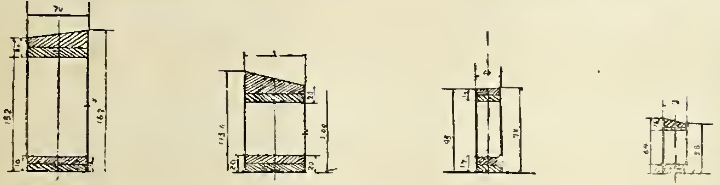


Fig. 4.

waterproof casein cement, which is proved to contain gelatine, while the plywood adhesive—also a casein cement—is waterproofed and of sufficiently good quality to withstand four hours' immersion in boiling water.

The trailing edge is of wire, and tape crosses from the top of one rib to the bottom of the next in the usual way. This tape lattice occurs about half-way between the trailing edge and the rear spar.

Fig. 3 shows the sections of the front and rear upper plane spars, taken in the centre section and at the interplane struts, while Fig. 4 gives the corresponding lower spar sections.

The ribs are stiffened between the spars by vertical pieces of wood of triangular section. There are two such pieces on each rib in the upper plane, and one in the lower plane.

All the woodwork of the wings is varnished, and fabric is bound round the flanges of the ribs and glued to the top and bottom of the spars.

The workmanship is decidedly good, and the finish neat and careful.

Ailerons

As in the triplane, ailerons are fitted to the top wing only, and are of the same narrow shape. They are constructed of welded steel tubing. They conform to common German practice, in as much as they are fitted to a false spar well behind the rear spar, and are balanced. The welded up control lever follows British ideas, and does not work, as in most German designs, horizontally in a slot cut in the plane. All the tubing is lacquered.

Struts

The struts are all of steel tubing of streamline section, and the centre section system is particularly worthy of attention. All those three struts which meet at a point on the front spar of the upper wing are welded to the fuselage framework, and are thus not removeable when the machine is dismantled (see Fig. 5). The strut which joins the rear upper spar to the front lower spar, however, is not welded but is fastened by a ball and socket joint, which is the subject of Fig. 6. It will be noticed that the ball forms the extremity of a threaded bolt which is screwed into the end of the strut, thus making it possible to adjust the length of the latter. Both ball and socket are drilled and a bolt locked through the hole. The attachment of upper centre section struts to the wing spar is shown in Fig. 7.

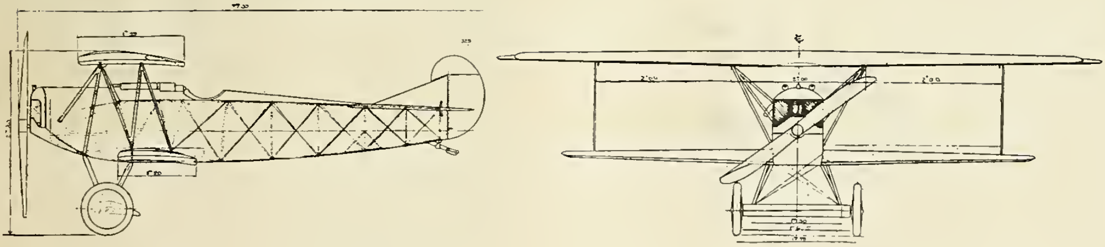
As is made clear in the scale drawings, the interplane struts are of N shape when seen from the starboard wing tip. The three members of the N are welded together, and all four free extremities have the adjustable attachment described above. It has already been mentioned that there is no external bracing, the wing construction being made sufficiently strong against lift stresses to obviate its necessity, and the form of the interplane struts is interesting in this connection.

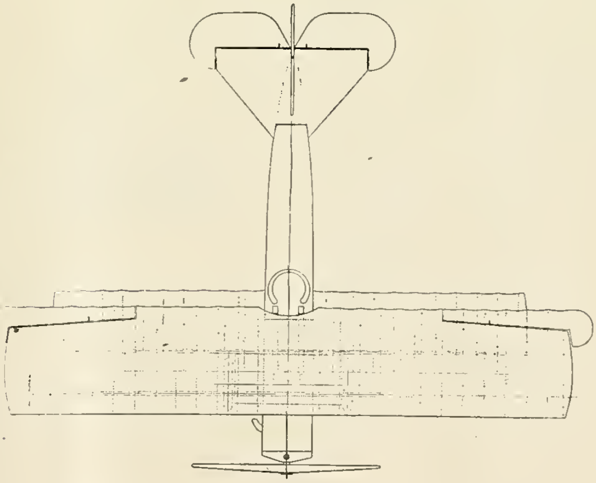
Fuselage

This is exactly similiar in design and construction to the triplane body—allowing of course, for the difference in type of engine and for the fact that both wings have two spars instead of one. The longerons and cross struts are of circular section steel tube welded in place, and carrying at the corner the small quadrant of steel tube which carries the bracing. The diameters of these tubes vary from 22 mms. to 18 mms., and the steel was of 24 gauge in the places where the tubes had been pierced by bullets.

This bracing well repays attention. All sides of each section are cross-braced with piano wire, which is simply passed round the two lugs to be joined and has its extremities connected by means of a turnbuckle. This method has the great advantage that only two loops are required in the wire instead of four, and in consequence this bracing can be very rapidly assembled. It is also possibly lighter in relation to its strength than the usual arrangement of single wire bracing. Fig. 8 shows how a lifting handle is clipped on to the lower longerons.

The front part of the body is a particularly good piece of welding, and includes the engine and radiator supports as well as the arrangement by which the continuous spars of the lower planes can be placed in position. This is done by removing two fork-ended tubes (one each side of the body), and replacing these when the wings are in position. Fig. 9 shows how the





THE FOKKER SINGLE-SEATER BIPLANE.—Type D.7.

SPAN	29′ 3½″app.
CHORD TOP PLANE ...	5′ 2½″ ,,
,, BOTTOM ,, ..	3′ 11¼″ ,,
OVERALL LENGTH ..	22′ 11½″ ,,
TAIL PLANE SPAN	6′ 0″ ,,
HEIGHT	9′ 2½″ ,,
AIRSCREW	
GAP	4′ 2″ ,,
STAGGER	1′ 11½″ ,,
ENGINE	... Mercedes 160 h.p.

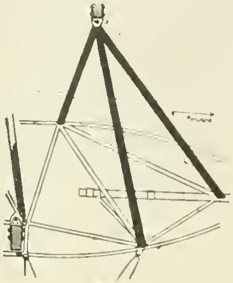


Fig. 5.

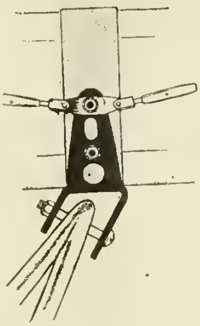


Fig. 7.

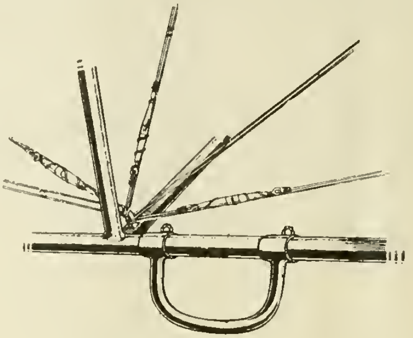


Fig. 8.

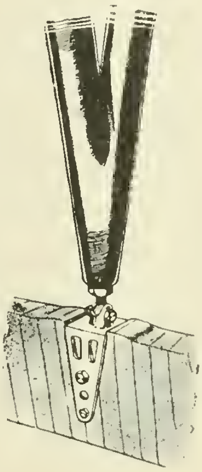


Fig. 6.

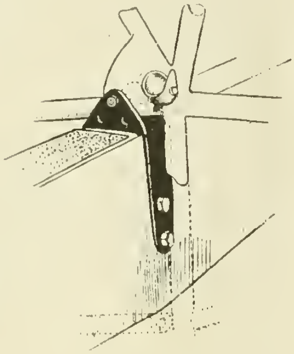


Fig. 9.

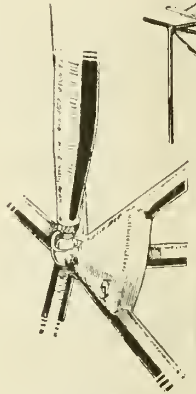


Fig. 10.

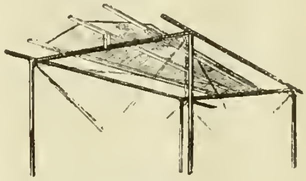


Fig. 11.

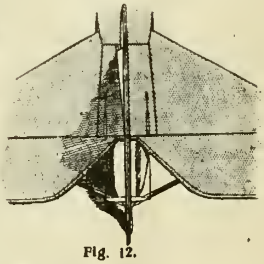


Fig. 12.

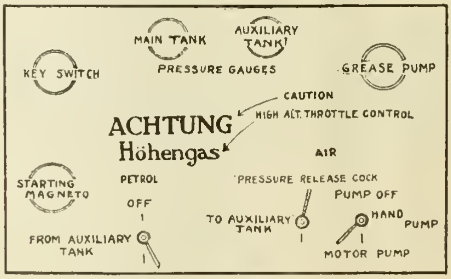


Fig. 17.

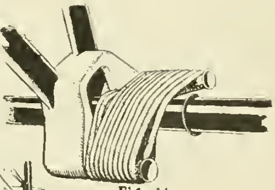


Fig. 14.

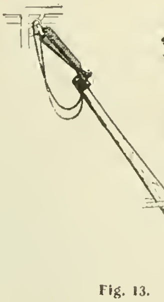


Fig. 13.

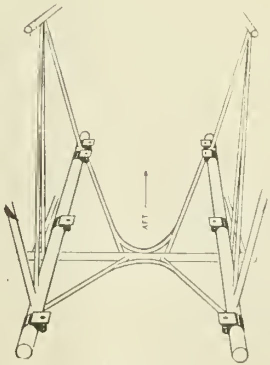


Fig. 15.

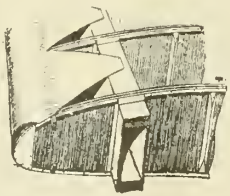


Fig. 2.

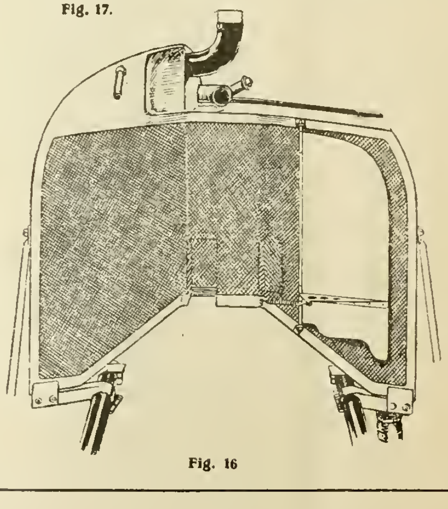


Fig. 16

wing spar is joined to the fuselage and Fig. 10 shows the fuselage joint at this point.

The cowling is of aluminum, and covers the front portion of the fuselage on all four sides. It is extended on the top to the cockpit, and underneath to beyond the rear spar. The cowls are arranged in convenient sheets, and are fastened by means of bolts and nuts of unusual shape. The nuts have small handles about 1 in. long, which enable one to manipulate them without tools. From the rear half of the cockpit to the junction of the tail and body, the top is furnished with a three-ply fairing, which extends over not quite the whole width of the fuselage. This is shown in Fig. 11.

Tail

The fixed tail planes and elevators are almost similar to those of the triplane, i.e., the tail is triangular and the elevators balanced and divided, although they are actually made in one piece. The biplane, however, has a triangular fin whose foremost point is fixed an inch or two to the port side of the centre line of the machine, thus providing a surface which is inclined slightly to the longitudinal axis of the aeroplane. This is illustrated in Fig. 12, and is no doubt arranged to balance the tendency of the machine to turn to the left in flight, due to the slipstream.

The framework of the tail is of circular section steel tubing throughout, including the trailing edges, and this framework is arranged to give the fixed tail a symmetrical camber. The attachment of the tail plane to the fuselage is simple and effective. As is the case in the triplane, the top longerons are dropped at this point sufficiently to allow the tail plane to have its top surface level with the top of the fuselage, and three bolts passing through the main steel tube of the tail and through short pieces of tube welded to the body framework secure it in this position. Of the three bolts, one is placed at either side of the top of the fuselage on the front of the tail, and one at the end of the body framework. The tail plane is set at a slight angle of incidence—about 3½ deegrees—which is not intended to be adjustable, but which could easily be altered by means of a few washers and longer bolts. The tail is stayed by two streamline section steel struts, which connect the rear tube of the tail plane with the bottom of the sternpost, as is shown by the general arrangement drawings. These struts are not barbed.

From the sketch of the tail skid (Fig. 13), it will be seen that this member is balanced at a point about one-third of its length from its lower end, and that the shock-absorbing arrangement consists of two helical steel springs.

Undercarriage

This is a feature of the machine which carries a distinct trace of British influence. The angle between the two limbs of the Vee is usually, in German aeroplanes, very obtuse; i.e., the two top points of attachment are widely separated, while British practice leans towards making this angle fairly acute. In the Fokker the angle between the struts is about 55 degrees. The section of the steel struts is streamlike in form, with major and minor axes of 65 mms. and 34 mms. recpectively. The metal is of 20 gauge.

The upper attachments of the undercarriage struts are of the ball and socket type, with a bolt through, similar to the interplane strut illustrated above. The junction of the lower extremities and the slot which allows for axle travel is clearly explained by Fig. 14. The bracing cables, which connect the upper extremities of the front struts with the opposite lower ends, are attached in the usual manner to lugs welded on to the struts. It is interesting to note that in the crash which wrecked the machine, one of these lugs has torn out a small piece of the sheet steel of which the strut is formed, though there is no sign of fracture at the weld.

The least usual characteristic of the landing carriage, however, is the provision of a small cambered plane surrounding the axle, just as is the case in the Fokker triplane. This auxiliary plane has been badly battered, and few details are available, but the sheet aluminium box which surrounds the axle remains. This box is rectangular in section, and the edges are riveted together on the upper side. It forms the main and only spar of the plane, the construction of which is very similar to that of the main plane. The shock absorbers are of the coil spring type, and are wrapped in the manner illustrated in Fig. 14. The wheels are 760x100.

Engine and Mounting

The engine is a Mercédès of 180 h.p. A full report on this type of engine has already been issued, but the present example possesses one or two minor points of difference from the standard. The chief of these is the fact that this engine has domed pistons, giving higher compression. If found sufficiently interesting, the engine will shortly be reported upon separately.

As has already been mentioned, the engine bearers are steel tubes, supported on a steel tubular structure welded up integrally with the fuselage frame and with the centre section struts. The diameter of these two parallel tubes is 34 mms. and the gauge 14. Each tube carries four "pads" of the type shown in Fig. 15, to which the crankcase is bolted.

Radiator

The radiator, as may be gathered from the scale drawings and sketches, is of the car type (another departure from modern German design), and is supported by steel tubes which are part of a fuselage frame. The radiating surface is surmounted by a curved fairing, of which the port-side half is a brass water tank, into which the filler leads, while the starboard side is merely an aluminum fairing. The radiator is constructed of brass tubes arranged parallel to the engine crankshaft. The tubes are circular in section, but expanded into hexagons at either end and sweated up there. Each hexagon measures 7 mms. across the flats.

The single shutter, as will be seen on reference to Fig. 16, is normally held open by a spring, but can be closed at will by pulling a small cable. This shutter even when completely closed only puts out of action a small portion (roughly about one-third) of the cooling surface.

Petrol and Oil Systems

There is only one fuel and oil tank in the machine. It is of sheet brass and is slung from cross tubes clipped on to the top longerons, just in front of the ammunition magazines, which are placed immediately in front of the pilot.

So far as can be ascertained from such external evidence as is afforded by fillers, piping, the lines of rivets on the tank, and the gauges and petrol cocks, it may be said that this tank is divided into two petrol tanks and one oil tank. The main petrol tank has a capacity for 61 litres (approximately 13½ gallons), and is provided with a baffle plate. The reserve tank holds 33 litres (approximately 7¼ gallons), while the oil tank carries 4½ gallons. From the brass disc which is sweated to each flank of the tank, it would appear that a tie rod passes across the tank from side to side. Both petrol tanks work under pressure, obtained initially by hand-pump, and maintained by the usual mechanical air-pump. The dashboard carries, besides the main switches and a starting magneto, a two-way cock which allows the pilot to use petrol from the main or auxiliary tank, or to shut it off completely. A separate pressure gauge for each tank and two two-way air pressure cocks are also mounted. Fig. 17 is a diagram of the dashboard with the original German descriptions translated. The "Achtung, Hohengas" appears to be simply a warning to the pilot not to forget the extra air control. It does not seem to bear any relation to any instrument on the dash.

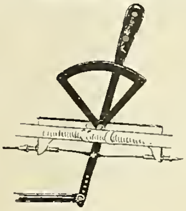


Fig. 18

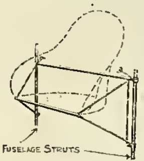


Fig. 22.

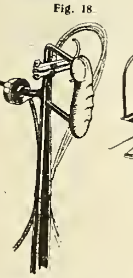


Fig. 19.

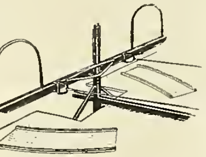


Fig. 21.

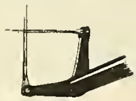


Fig. 20.

Throttle Control

A sketch of the throttle lever, situated on the pilot's left, is given (Fig. 18). This lever actuates the carburettor throttle by the means shown. The compression tube between the quadrant and the balanced lever is over four feet long and about five-eights inch in diameter. Although heavy-looking, this control is, of course, made of very light gauge material. The adjustment provided at the pilot's end of the control should be noticed. The control works in conjunction with a Bowden type lever on the control lever, as shown by Fig. 19. The twin cables from this auxiliary throttle lever are attached to the main throttle control—Fig. 18 shows the attachments.

Controls

The control lever of the machine works on precisely the same system as that of the triplane, but the grip at the head of the column is quite different. Reference to Fig. 19 will show that the usual two-handed grip is replaced by a single handle for the right hand.

The left hand is free to manipulate the auxiliary throttle control, inter-connected with the main throttle lever. It should also be noticed that the usual pushes for firing guns are absent, and the interrupter gear is actuated by pulling either or both of the levers by the fingers, while the thumb rests on the specially arranged place. There is no separate arrangement for firing both guns together, and it is not possible to lock the elevator controls in any given position.

The longitudinal rocking shaft carries at its front end two arms to which the aileron control cables are fixed (see Fig. 20). These wires cross; and pass upwards and outwards to aluminium pulleys on ball bearings, which are attached in pairs to a hinged sheet steel framework. On the way these cables pass through short tubular guides fixed to the top longerons. The aileron levers follow contemporary British practice, and project vertically above and below the plane.

The elevator control wires are taken direct from the control lever, one pair above and one below the fulcrum.

The rudder bar (see Fig. 21) is of neat and light welded construction. There is no adjustment to allow for variation in leg-length of different pilots, but it should be notices that the pilot's seat is adjustable as regards height. The means by which this movement is obtained is exactly the same as the arrangement in the triplane, i.e., the seat is a sheet aluminium bucket with a three-ply bottom supported by a framework of of steel tubes which grips the fuselage cross struts by four clips, which can be placed at any height. This is made clear by Fig. 22.

Fabric and Dope

The fabric is not attached in any way to the longerons, but is simply carried over the fuselage and laced along the bottom central line. There is a cross-piece of fabric laced to the cross tubes immediately behind the cockpit.

The fabric is coarse flax, coarser and less highly calendered than the type usually met with, and a good deal heavier.

It is colour-printed in the usual irregular polygons. The bright red paint, mentioned below, is removable by alcohol, but not soluble in it, coming off as a skin under the treatment.

Under the paint is a dope layer—an acetyl cellulose. Neither paint nor dope presents unusual features.

Weights—

Paint	92.0 gms. per sq. m.
Dope	68.1 gms. per sq. m.
Fabric	143.6 gms. per sq. m.
	303.7 gms. per sq. m.
Strength	1772 k/m.
Extension	7.0 per cent.

Where the wings are not painted, the fabric is covered with a thin layer of dope only.

The coloring of the machine is interesting. The top surface of the wings is painted a brilliant vermilion, while on the underneath surfaces the fabric is untouched, and is revealed as the familiar printed-color fabric. The body is red in the front portion—where are the aluminium cowls—except the radiator, which is painted white. From the cockpit to the rear the color is white.

The vertical surfaces of the tail are also white, and the horizontal surfaces—on both top and bottom—black.

Schedule of Principle Weights

	lbs.	oz.
Upper wing, complete with ailerons, pulleys, bracing wires, facric and strut fittings	156	0
Lower wing (no ailerons fitted), complete with strut fittings and fabric...	97	0
N strut between wings	6	9
Straight strut, between fuselage and trailing spar of upper wing	2	8
Aileron frame, with hinge clips, without fabric	4	8
Rudder frame, with hinge clips, without fabric	4	11
Fin frame, without fabric	1	14
Tail planes (complete in one piece), without fabric	12	6
Elevators (complete in one piece), without fabric	11	2
Radiator, empty	48	0
Undercarriage strut, each	2	10
Undercarriage axle, with shock absorber bobbins	18	2
Bobbin, each	0	7
Shock absorber, each	3	9
Undercarriage (complete), without wheels and tires, and without plane, but including struts	29	4
Aluminium tube, forming rear spar of undercarriage plane	1	8
Wheel, without tire and tube	11	8
Tire and tube	9	4
Tail strut	1	15
Fabric, per square foot, with dope....	0	1
Bottom plane compression rib	0	15
Bottom plane ordinary rib	0	11
Top plane ordinary rib, at centre of plane	1	0
Bracket, with bolts, attaching top plane to fuselage struts	1	11
Main spar, top plane, including fillet for ribs, per foot run in centre...........	1	12

Owing to tapering ends the average weight per foot of the spars will be slightly less than this figure.

The new American-made dirigible airship in flight. It is equipped with two 150 H.P. Hispano-Suiza motors

AERO CLUB AWARDS MEDALS OF MERIT

THE Aero Club of America has awarded a medal of merit to Major B. L. Smith of the Marine Corps and Lt. R. A. D. Preston, U.S.N., to commemorate the first long distance flight made with the first twin-motored dirigible. The D-17, the largest naval dirigible, made a successful trip from Akron, O., to New York, on October 22nd.

The Navy Department's official statement reads as follows:

"Manned by aviation officers of the Marine Corps and the Navy, and with two civilian mechanics aboard, the first of the Navy's twin motor dirigibles, flew over Washington on October 22d at the completion of the first lap of approximately three hundred and fifteen miles, of a flight from Akron, O., to Rockaway, N. Y. The big dirigible landed at the Anacostia aviation

(*Continued on page* 429)

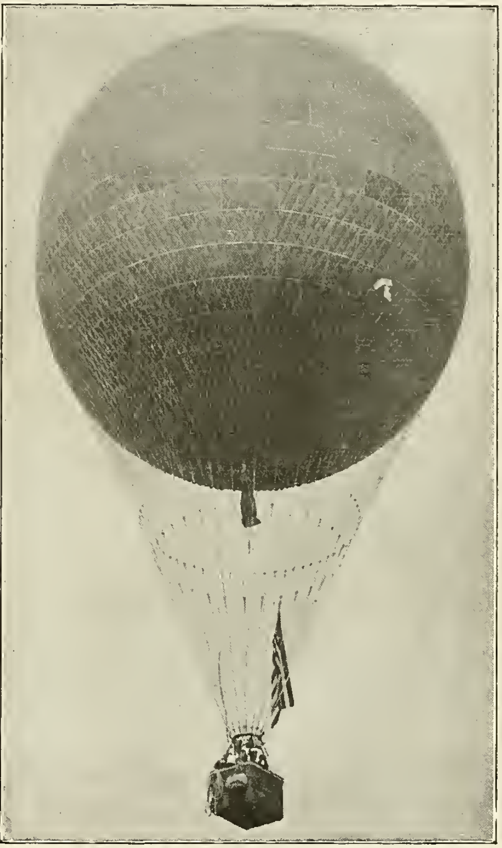
Getting the new dirigible ready for flight

GENERAL KENLY, COLONEL BRANT AND COLONEL DAVIS UP IN A BALLOON

ON October 17th the energetic Chief of the Air Service, Major-General William L. Kenly, Colonel H. B. Hersey, and Colonel A. L. Fuller, went up in a balloon piloted by Major J. C. McCoy. The balloon started from the Polo Grounds, Washington, D. C., and landed in the outskirts of Baltimore, after a trip of about three hours and fifteen minutes under most ideal weather conditions. There being little wind, the officers were able to scatter Liberty Loan posters over Washington. It was General Kenly's first balloon trip and he enjoyed it immensely.

On October 19th another ascension was made with the same balloon, which has a capacity of 35,000 cubic feet, and was filled with hydrogen. Colonel C. G. Brant, Colonel M. F. Davis and Major J. C. McCoy were the passengers and A. Leo Stevens, the veteran balloon expert, was the pilot. The wind was favorable and they landed at Everett, Penna., after having passed through Maryland, Virginia, West Virginia and Pennsylvania, crossing the Alleghany Mountains at 5,000 feet. They were up five hours and Colonel Brant and Colonel Davis, whose first trip it was in a balloon, were delighted with their experience.

Major McCoy has the distinction of holding the first balloon pilot certificate issued in America. Colonel Hersey, A. Leo Stevens and Major B. B. Daggett, who did the work of getting the balloon off, are veterans in the balloon game.



Major-Gen. William L. Kenly, Director of Military Aeronautics, recently made a flight in a free balloon from Wasbington. Here is shown the balloon just after it left the ground. The dragrope, which can be seen coiled at the left of the basket, has not yet been released. With him were Colonel A. L. Fulton, Colonel H. B. Hersey, and Major J. C. McCoy, who piloted the balloon

Before the flight, tiny rubber balloons were sent up to ascertain the upper air currents. They were inflated with hydrogen from the hydrogen bottle seen in the illustration. The officers in the photo are (left) Captain Smythe and (right) Major J. C. McCoy

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(*Continued from page* 428)

field for a fresh supply of fuel, but resumed its flight at 1:17 P. M. The start was made from Akron this morning at 1:10 A. M., Central Time, and the landing was made at 11:10 Eastern Time, a running time of nine hours, approximately 35 miles an hour. The flight over Washington was made at a low elevation, and as the dirigible flew over the new Navy Building, then circled over the White House and Treasury, thousands had a close view of it."

The dirigible, marked D-17, flew low over Washington and caused considerable commotion. Through the mark, D-17, the public learned that it was a naval dirigible. The ship has a hydrogen capacity of about 180,000 cubic feet, and is equipped with two Hispano-Suiza motors of 150 horse power. The following were the crew on board: Major B. L. Smith, Marine Corps; Lieut. R. A. D. Preston, U.S.N.R.F.; Lieut. (j. g.) D. T. Hodd, U.S.N.R.F.; Lieut. (j. g.) W. L. Hamlin, U.S.N.R.F.; Ensign J. Esterley, radio operator; and M. Roulette and James Royal, civilian mechanics.

This was the first trip made by dirigible from Akron to Washington, and from Washington to New York, therefore, it has historic value.

The only recent long distance trip on the part of a dirigible was made by a Goodyear Dirigible, the D-12, when it made a 360 mile flight from Akron, O., to Dayton, O., and return, last summer. The D-12 was equipped with a single motor, whereas the D-17 is equipped with two motors.

NAVAL and MILITARY AERONAUTICS

Key to Abbreviations

AAD—Assigned to active duty.
ABC—Report to Army Balloon School, Arcadia, Cal.
ABC—Report to Army Balloon School, Arcadia, Cal.
ADO—Report to Aviation Supply Depot, Dayton, Ohio.
ADT—Report to Aviation Supply Depot, Dallas, Texas.
AFO—Report to Aviation Supply Depot, Fairfield, O.
AGC—Report to Aviation Supply Depot, Garden City, L. I., N. Y.
AHT—Report to Aerial Gunnery School, Houston, Texas.
AIR—Transferred to the Air Service, National Army, without change in rank or date of commission.
ALF—Report to Camp Alfred Vail, Little Silver, N. J.
AMV—Report to Aviation General Supply Depot, Morrison, Va.
AOV—Report to School for Aerial Observers, Hampton, Va.
APR—Report to School of Aerial Photography, Rochester, N. Y.
ARV—Report to Aviation Supply Depot, Richmond, Va.
ASM—Report to Aviation Mechanics' Training School, St. Paul, Minn.
BFT—Report to Barron Field, Fort Worth, Texas.
BRN—Report to Bakers Field, Rochester, N. Y.
BST—Report to Brooks Field, San Antonio, Tex.
CAF—Report to Carlstrom Field, Arcadia, Fla.
CAP—Commissioned as Captain, Aviation Section, Signal Corps.
CDT—Report to Aviation Concentration Camp, Dallas, Texas.
CFT—Report to Carruthers Field, Fort Worth, Texas.
CGC—Report to Aviation Concentration Camp, Garden City, L. I., N. Y.
CGS—Report to Aviation Concentration Camp, Greenville, S. C.
CIT—Report to Radio School, Carnegie Institute of Technology, Pittsburgh, Pa.
CJS—Report to Camp Jackson, Columbia, S. C.
CJW—Report to Camp John Wise, San Antonio, Texas.
CLR—Commissioned as Colonel, Aviation Section, Signal Reserve Corps.
CMV—Report to Aviation Concentration Camp, Morrison, Va.
CPA—Commissioned as Captain Air Service, National Army.
CPR—Commissioned as Captain, Aviation Section, Signal Reserve Corps.
CRI—Report to Chanute Field, Rantoul, Ill.
CSO—Report to the Chief Signal Officer, Washington, D. C.
CUI—Report to School of Military Aeronautics, Cornell University, Ithaca, N. Y.
CWT—Report to Call Field, Wichita Falls, Texas
DAF—Report to Dorr Field, Arcadia, Fla.
DAP—Report to Director of Aircraft Production, Washington, D. C.
DIK—Report to Camp Dick, Dallas, Tex.
DIS—Honorably discharged from service.
DMA—Report to Director of MilitaryAeronautics, Washington, D. C.
ELA—Report to Eberts Field, Loanoke, Ark.
EOT—Report to Ellington Field, Olcott, Texas.
FLA—Commissioned as First Lieutenant Air Service, National Army.
FLR—Commissioned as First Lieutenant, Aviation Section, Signal Reserve Corps.
FLT—Commissioned as First Lieutenant, Aviation Section, Signal Corps.
FOB—Report to Fort Omaha Balloon School, Omaha, Neb.
FRF—On duty requiring regular and frequent aerial flights.
FSO—Report to Fort Sill School for Aerial Observers, Fort Sill, Okla.
GIT—Report to School of Military Aeronautics, Georgia Institute of Technology, Augusta, Ga.
GLC—Report to Gerstner Field, Lake Charles, La.
HHN—Report to Hazelhurst Field, Mineola, L. I., N. Y.
JMA—Rated as Junior Military Aviator.
JRC—Report to Jackson Field, Riverside, Cal.
KST—Report to Kelly Field, So. San Antonio, Tex. (When specified in the order, the number of the field is given in parentheses)
LDT—Report to Love Field, Dallas, Tex.
LHV—Report to Langley Field, Hampton, Va.
MAC—Report to March Field, Allesandro, Cal.
MAJ—Commissioned as Major, Aviation Section, Signal Corps.
MAT—Report to Mather Field, Sacramento, Cal.
MDO—Report to McCook Field, Dayton, Ohio.
MIA—Report to U. S. Naval Air Station, Miami, Fla.
MIT—Report to School of Military Aeronautics, Massachusetts Institute of Technology, Boston, Mass.
MJA—Commissioned as Major Air Service, National Army.
MJR—Commissioned as Major, Aviation Section, Signal Reserve Corps.
MSC—Report to Radio School, Maryland State Agricultural College, College Park, Md.
OBS—Attached to the Aeronautical Service as Observers.
OSU—Report to School of Military Aeronautics, Ohio State University, Columbus, Ohio.
PFO—Report to Post Field, Fort Sill, Okla.
PMT—Report to Park Field, Millington, Tenn.
PUP—Report to School of Military Aeronautics, Princeton University, Princeton, N. J.
PWM—Report to Payne Field, West Point, Miss.
REL—Relieved from present duty.
RSD—Report to Rockwell Field, San Diego, Cal.
RTR—Retransferred to organization attached to previous assignment to aviation duty.
RWT—Report to Rich Field, Waco, Tex.
SBI—Report to Scott Field, Belleville, Ill.
SAG—Report to Souther Field, Americus, Ga.
SGS—Report to Camp Sevier, Greenville, S. C.
SLA—Commissioned as Second Lieutenant Air Service, National Army.
SLR—Commissioned as Second Lieutenant, Aviation Section, Signal Reserve Corps.
SLT—Commissioned as Second Lieutenant, Aviation Section, Signal Corps.
SMA—Report to School of Military Aeronautics, Cambridge, Mass.
SMM—Report to Selfridge Field, Mount Clemens, Mich.
SRC—Report to Columbia School for Radio Officers, New York City.
TFT—Report to Taliaferro Field, Fort Worth, Texas. (When specified in the order, the number of the field is given in parentheses)
TMA—Report to Taylor Field, Montgomery, Ala.
UCB—Report to School of Military Aeronautics, University of California, Berkeley, Cal.
UIU—Report to School of Military Aeronautics, University of Illinois, Urbana, Ill.
UTA—Report to School of Military Aeronautics, University of Texas, Austin, Tex.
VBW—Report to Vancouver Barracks, Washington.
WAC—Report to Aviation Concentration Camp, Waco, Tex.
WCS—Wire to the Chief Signal Officer upon arrival.
WDM—Wire, Director of Military Aeronautics, upon arrival.
WFO—Report to Wilbur Wright Field, Fairfield, Ohio.

Notes

Note 1—Report to places mentioned in order named for temporary duty.

Note 2—Report to Dayton, Ohio, Cbief Technical Section.

Note 3—Report to Dayton, Ohio, Production Engineering Dept.

Note 4—Report to Dayton, Ohio, Dis. Mgr. of Aircraft Finance.

Note 5—Report to Naval Hydroplane Station, Pensacola, Fla.

Note 6—Report to Standard Aircraft Corp., Elizabeth, N. J.

Note 7—Report to Dis. Mgr. Aircraft Finance, Detroit, Mich.

Note 8—Report to Students' Army Training Corps, Lafayette College, Easton, Pa.

Note 9—Report to Commanding General, Boston, Mass.

Note 10—Take station at Cumberland, Md. Wire DMA.

Note 11—Report to Aviation Gen. Supply Depot, Middletown, Pa.

Note 12—Report to Dis. Office of Production, Dayton, O. Wire DAP.

Note 13—Report to Commanding General, Central Dept., Chicago, Ill.

Note 14—Report to Major E. S. Moore, Dis. Mgr. Production, Buffalo, N. Y

Special Orders, Nos. 234-238 Inc.

A

Albery, Freeman	EOT
Arnold, Ernest C.	FLA; MSC
Austin, Edward C.	LDT
Andrews, Mark	CPA
Andrews, John P.	CGC
Austin, Carter H.	TFT
Aaroe, George Christian	CPA
Alsip, Frank W.	CPA
Anderson, Otho B.	CPA
Alexander, Harry S.	CPA
Adams, Jack Richard	SLA; ELA
Anderson, Leland Stanford	SLA; CFT
Anderson, Charles Ewing	SLA; SAG
Axberg, Edward	SLA; CFT
Albery, Freeman	SLA; PWM
Aurelius, Paul John	SLA; CFT
Abernethy, Wilbur Kingsley	SLA; AAD
Ayers, George R.	AGC
Amis, William N.	AGC
Allen, Albert Delos	FLA
Anderson, Wallace Alexander	FLA
Ashwell, George Gouverneur	FLA
Arnold, Ivan T.	FOT
Anderson, Arnold A.	MIA
Allen, Irving E.	EOT
Acosta, Bertram Blanchard	CPA
Ashby, William T.	MIA
Abbey, Evers	DMA; TMA; Note 1
Andrews, Elmer F.	CGC
Aney, Melvin	CGC
Allison, Roy G.	PWM

B

Benedict, Howard M.	WFO
Brown, William C. F.	SMA
Buckley, William Joseph	SLA; CWT
Batchelder, Charles Shaw	SLA; CWT
Benedict, Maurice T.	TFT
Boyd, Linn	TFT
Bubb, Harry Agnew	MJA
Blood, Howard Earl	MJA
Bartelt, Frank Edward	SLA; CFT
Brandt, Alvin Rudolph	SLA; CFT
Borre, Peter Celestine	SLA; SAG
Burdick, Harry Avery	SLA; ABC
Bridgman, Ethan Allan	SLA; ABC
Birnn, Roland	SLA; TMA
Blotter, Richard G.	TFT
Biber, Walter Earl	SLA; GLC
Bohrer, Charles R.	BST
Baker, Foster Kenneth	SLA; CWT
Burkhardt, Harry Lee	SLA; KST
Blevens, Charles Elmo	SLA; KST
Borden, Cecil Alexander	FLA
Bruton, David Derden	FLA
Burge, Edwin	FLA
Burton, Joseph W.	FLA
Bainey, James Andrew, Jr.	PWM
Blair, Lewis Francis	SLA; CWT
Berry, Richard B.	RSD
Bostwick, William Harmon	CPA
Babcock, Raymond A.	KST
Brainard, Spencer	CPA
Bettis, Cyrus	SLA; CWT
Boies, Sherhan H.	CPA
Bunting, Walter Mills	SLA; AAD
Blair, Percy A.	CPA
Benson, Reynolds	CPA
Blakeman, Frederick T.	CPA
Brockway, Albert L.	CPA
Brown, Paul D.	CPA
Barrett, William	CPA
Bleecker, William H., Jr.	FLA
Bleistein, George, Jr.	CPA
Bleach, Stephen Stanley	SLA; ABC
Blanchard, David	SLA; PMT
Boomer, Floyd Henry	SLA; ABC
Black, Ernest Bateman	CPA; DAP
Bailcy, Joseph Norbert	SLA; DAP
Brown, Ronand Whetten	SLA; CRI
Bijur, Harry	FLA
Borum, Fred Sidney	FLA
Barker, Donald Vernon	SLA; SAG
Beil, Richard M.	CGC

Bellmont, Lee T.	KST
Batts, Carl T.	DAF
Block, Kenwood Morton	SLA; CWT
Baxter, Maxwell	FLA
Bell, Cecil Kenneth	FLA
Brooks, Martin V. B.	KST
Brewer, Scott Ridge	CPA
Bumstead, John Henry	SLA; PWM
Buckley, Daniel	KST
Barb, Martin B.	PWM
Bond, George C.	CGC
Browning, Irving K.	CGC
Bricka, Walter William	SLA; SAG
Burgtorf, Edward Allen	SLA; SAG
Blandford, James T.	MIA
Baldwin, Henry Marvin	SLA; ELA
Bagley, Frank Horace	SLA; KST
Buckingham, Dwight Monson	SLA; ABC
Boxell, Morris Lanpher	SLA; ABC
Boyer, George P.	BST
Brown, Frank K.	BST
Byers, Ralph Rollin	PMT
Brown, Lincoln George	SLA; ABC
Buckmaster, Samuel A.	CGC
Bonn, Wesley C.	AGC
Burns, John R.	AGC
Bloomer, James Ralph	FLA
Baker, Earle F.	BST
Berg, George Oscar	SLA; RWT
Bach, Hollis Sebastian	SLA
Belote, George Harold	SLA
Buell, William Charles	SLA
Birch, Leland Watts	FLA
Bragg, Caleb Smith	CPA
Buff, Frederick William	SLA
Boomer, Floyd H.	CJW
Brandon, Elvis Denby	SLA; CWT
Bower, Paul E.	CGC
Bonisteel, Roscoe Osmond	CPA
Buttler, Bruce B.	DMA
Binford, Morton C.	CFT
Banholzer, Clarence C.	SMM
Benson, John David	SLA
Bloom, George Barnett	SLA
Blair, Bert R.	CGC
Bouvier, John Vernon, 3d	MJA
Bertaud, Lloyd W.	CGC
Bailey, Dan W.	MIA
Bohrer, Charles Richard	SLA; KST
Brumback, Jefferson U.	Note 2
Bailey, Joseph Popenjoy	SLA; RWT
Bacon, Asaph P.	AGC
Brass, Philip H.	Note 15
Bullock, Bryant W.	EOT
Baldwin, Charles B.	TFT
Byrnes, Ralph J.	TFT

C

Cooley, Arthur B.	TFT
Copeland, Jay M.	TFT
Curtis, Erland L.	TFT
Conklin, David Edward	SLA; RWT
Cheston, Radcliffe, Jr.	CPA
Curtis, Emory Blake	SLA; GLC
Copenhaver, Edwin Henry	SLA; PWM
Chauchoin, Charles August	SLA; CWT
Cochrane, Robert Bryce	TFT
Crandall, Winfield Roger	CPA
Cobb, Elliot	CPA
Curtis, Sidney B.	CPA
Colton; Deane W.	TFT
Cody, Joseph J.	CPA
Cone, J. Carroll	CPA
Close, Harry B.	CPA
Cumming, Clarence Warder	CWT
Chennault, Claire L.	LHV
Cunningham, Arthur L.	FLA
Colbert, Lewis F.	FLA
Campbell, Douglas	CPA
Cooper, Marion Caldwell	CPA
Carr, John P.	SMM
Clarkson, John W.	SMM
Campbell, Marston, Jr.	MAT
Culbertson, Robert A.	SMM
Cady, Harry Charles	SLA; ABC
Cameron, Briton M.	CGC
Clark, Robert Ernest	SLA;CRI
Cundiff, Lawrence B.	CGC
Cornog, Isaac C.	CGC
Cassidy, John Alexander	SLA; CWT
Chandler, Lane T.	CGC
Crane, Charles B.	MJA
Carberry, James Paschal	FLA
Colmery, Harry Walter	FLA
Cory, Wayne Meisner	FLA
Coney, William D.	CGC
Cunningham, Ray Michael	SLA; AAD
Churchwell, Daisy Lee	SLA; CWT
Crim, William D.	KST
Cabot, Thomas D.	MIA
Chrystie, Edward P.	LHV
Carmody, Arthur R.	EOT
Crandall, Winfield R.	Note 5
Cook, Robert G.	Note 6
Cameron, Mortimer B.	BST
Crowl, Leon W.	TFT
Cunningham, Parker H.	Note 7
Chapman, William B.	MIA
Collar, Gilbert T.	SMA
Campbell, Eno	CGC
Clark, Harold L.	CGC
Cronan, Robert T.	CGC
Clark, Ben H.	CGC
Christiansen, Charles E.	CGC
Chambers, Harold C.	CGC
Cooper, Russell H.	CGC
Crawford, William L.	CGC
Culver, Benjamin C.	CGC
Church, Rollin S., Jr.	BST
Cassidy, Charles Walter	SLA
Cragon, Miller Murray	SLA
Candlish, Robert Harrison	SLA; AAD
Chambers, Howard Elmer	SLA
Cooper, Elmer E.	AGC
Crawford, Daniel M.	AGC
Chandler, William Henry	CPA
Croxford, Frank D.	AGC
Clinton, Edgar Thompson	SLA; SAG
Clough, Charles Edwin	SLA; CWT
Chilton, Cyrus H.	SMM
Critchley, Horace F.	SMM
Cragon, Miller M.	PWM
Carson, Louis F.	EOT
Carleton, George Morrison	SLA; ABC
Chilson, Roy W.	KST
Chadwick, Stuart	CGC
Church, George Myers	CPA
Campbell, Hugh Siler	SLA; SAG
Clancy, Edwin M.	BST
Colburn, Eldred Brenna	SLA; ABC
Cady, Harry C.	CJW
Cargill, Charles R.	AGC
Circle, Ralph E.	CGC

D

Doak, Carroll David	SLA; SAG
Doherty, George Joseph	SLA; SBI
DeForrest, John	AGC
Duggan, James R.	TFT
Dunham, Carroll	SMA
Duncan, James Cameron	SLA; CWT
Davis, Richard Stanley	CPA
Downe, George Edward	CPA
Dobie, Richard L.	FLA
Dwyer, Geoffrey J.	CPA
Drake, Alonzo Manning	CPA
Dickey, Leslie Joseph	SLA; PMT
Drennen, Leonard H.	CGC
Davis, Richard Earle	FLA
Deeves, Edwin Pratt	FLA
Duke, Jack E., Jr.	FLA; DMA
Dick, Guy Henry	SLA; PWM
Dean, Alexander	CGC
Davis, Homer H.	SLA; PWM
Davies, Ward J.	PWM
Dobbins, Verne Foster	SLA; CWT
deSteiguer, Walter George	CPA
Danziger, Maurice	SLA
Davidson, Rufus Benjamin	SLA
Degen, Albert Gustav	SLA
De Voe, Elmer Paul	SLA
Dally, Joseph W. R.	CGC
Danne, Harold A.	CGC
Dean, Edward K.	CGC
DeWitt, Dalton G.	CGC
Donaldson, Howard L.	CGC
Doane, Glendon B.	EOT
Davidson, James Vergilius, Jr.	SLA; Note 14
Duddleston, Charles S.	Note 2
DeLorraine, Claude H.	Note 10
Davidson, Lawrence E.	EOT
Davis, Milton Ernest	FLA

E

Emerson, Sigard A.	RSD
Edwards, Chester H.	SMM
Ehlers, George Washington	SLA; PWM
Ervin, Robert G.	CGC
Eckert, Samuel B.	CPA
Eisenchimel, Milton Charles	FLA
Euchner, William H.	FLA
Elm, Ionar E.	EOT
Ellis, Walker M.	CPA
Estabrook, Benjamin W.	CPA
Ewell, John E.	CPA
Eldredge, James Sharp	SLA
Emberton, Robert D. V.	TFT
Ebaugh, John W.	CGC
Ely, William N., Jr.	CGC
Erickson, Arthur X.	PWM
Ells, Myron B.	BST

F

Fitzpatrick, Francis Edward	SLA; PWM
Ford, Charles E.	TFT
Foster, Thad V.	PWM
Fladeland, John E.	PWM
Fleet, Reuben H.	MJA
Fleming, Donald Livingston	SLA; GLC
Fleming, Carl	SLA; SAG
Feild, Rutledge Hughes	SLA; ELA
Fee, Ray E.	TFT
Ferguson, Harry C.	CPA
Flynn, Edward James	SLA; CRI
Field, John Bacon	SLA; ELA
Friedman, Harry B.	KST
Fisher, Robert Lewis	PWM
Fox, William A.	CPA
Ford, Fred M.	FLA
Fisher, George F.	CPA
Ferris, Eugene M. J.	CPA
Ferry, Jay R.	CPA
Fleitman, Henry T.	CPA
Fetters, Jay March	SLA
Foley, Andrew Edward	SLA
Francis, Paul Robertson	SLA
Foley, Raymond W.	Note 4
Field, Rutledge H.	AGC
Ford, Harold R.	AGC
Frindel, Samuel, Jr.	SLA
Frankley, Lawrence W.	AGC
Fyfe, Henry M.	SLA; BST
Fischer, Ira W.	CGC
Forshey, Fred William	FLA
Franclemont, Edward L.	CGC
Fahey, Thomas Francis	SLA; BFT
Fry, G. Kenneth	MIA
Fenno, Jesse K.	CGC
Filson, Harry R.	EOT
Faris, Nicholas Beatrous	SLA; BST
Finney, Olin	CPA
Freston, Herbert A.	KST
Farr, Marcus Stulls	CPA

G

Greene, George Gordon	SLA; PMT
Gaylord, Elmer James, Jr.	SLA; GLC
Glatts, Bernard Russell	CWT
Gregory, William R.	DMA
Garrett, Kenneth	SLA; CFT
Galt, John M.	AGC
Gledhill, Franklin W.	FOB
Gorman, Karl H.	AGC
Goldsmith, Bertham Joseph	SLA; SAG
Granniss, Norman Caleb	SLA; DMA
Giesecke, Bertram Ernest	FLA
Greene, Arthur D.	TFT
Green, Paul E.	CPA
Griffin, William	LHV
Glover, John LeRoy	CPA
Gwynne, Arthur	CPA
Gove, Robert Russell	SLA; PWM
Greenawait, Henry Samuel	SLA; SAG

(*Continued on page* 436)

The A. R. Dorand-Renault Corp d'Armee machine

FOREIGN NEWS

BRITISH

The Independent Air Force bombed the railways at Metz-Sablons on October 18 and at night dropped projectiles on the railways at Saarburg, according to an official announcement.

In withdrawing from Flanders and the Belgian coast the Germans not only gave up their submarine bases, but also left behind immense aerodromes. Before the enemy retirement northern Belgium might have been known as the home of the Gotha. By moving eastward the Germans lose the points nearest to England from which they used to carry out raids upon London and other English towns. Hereafter, it is believed, the Germans will find it increasingly difficult to make air raids upon London.

The evacuation of Ostend and Zeebrugge will make easier the work of the British navy in keeping the British Channel clear of submarines. The Germans also have been forced to remove the torpedo boats from these bases.

Germany has made herculean efforts to solve the problem of Mannheim and has failed. Night bombing continues to make life in that city almost unendurable. Its great chemical and munition works are vital to the Hindenburg armies. It cannot escape. Its huge buildings cannot be moved and the British airmen know their position exactly.

Continual bombing of the fiercest sort causes the workers to threaten to strike and fills the mass of the population with terror. Even if the workers do not strike, they are again and again driven from their post of duty, their rest is disturbed and their working capacity reduced. Peace at any price is becoming in Mannheim a cry that appalls the authorities. Anti-aircraft guns surround the town and their barrage is so thick that on a clear night the sky is overcast with the smoke of bursting shells. Kite balloons ring the place around and the cables holding these are connected with electrified wires.

Machine guns are mounted wherever there is any prospect of their firing effectively. Searchlights sweep the skies nightly. None of these devices nor all of them put together prevent bombers from droning through the darkness, one after another, across the lines along the silver ribbon of the Rhine.

The Britons, threading their way among the searchlights and bursting shrapnel at a great height, rush like shadows over the very rooftops of the town and fling down destruction while the archies and machine guns spread a harmless canopy of missiles over their heads. Perhaps in no other part of the theatre of war has the comparative helplessness of armed land folk against armed air folk been proved so strikingly as at Mannheim. In spite of the thickness of the perils that encompass the bombers, they come off with few casualties and often with none. There is one record of a year's bombing operations by the British against a place on the western front in which no Briton was wounded and no British machine lost.

Sometimes there is a false warning and all night long the populace awaits the thunder of bombs without any bombs falling. These warnings have caused the people to hear enemy machines when no enemy machine is anywhere near. Sometimes no warning is given when the Britons do come and in such cases the inhabitants get their first warning from the red flashes of bombs on the munition plants.

I have just heard of a fight on the Italian front in which one British fighting plane after a long chase, in company with a brilliant Italian airman, overtook nine Albatross scouts, manned by Austrians. Single-handed he fought the squadron, destroying four machines and scattered the others. Three of the Austrian machines fell on their backs and the fourth was telescoped after a nose dive. One Austrian pilot escaped in a parachute after his plane had turned turtle and could not be righted. The Briton rejoined his Italian companion uninjured.

Thirty hostile aeroplanes were destroyed, six driven down out of control, two downed from the ground, and one balloon shot down in flames, Field Marshal Haig reported on October 16 in his communique on aviation activities.

British flyers also bombed the Frescaty aerodrome, damaging a Zeppelin shed and wrecking a hangar. Casualties among the mechanics were noted. The enemy did not fire on the attacking squadrons.

Thirty three tons of bombs were dropped during the day and thirteen in night attacks. Eleven British planes were missing at the end of the day.

The official statement of October 24 dealing with the operations of the independent air forces says: "On Wednesday night we bombed railways at Burbach and Saarbrucken, chemical factories at Mannheim and railways at Coblenz, near Mainz, and at Metz-Sablons."

FRENCH

On October 21, along the west front and in Flanders, our observation squadrons carried out important work of reconnoissance and surveillance behind the enemy front. Two enemy planes were brought down, and a balloon was burned. During the early part of the night our bombing planes dropped 18,800 kilos of projectiles on important railway junctions, and, in particular, on the stations at Longuyon, Stenay, Hirson, Vervins, Marle, Montoornet, Rozoy-sur-Serre, Previsy-sur-Serre, and Liart. They noted a great number of hits on their objectives, following which fires broke out in the stations at Longuyon, Hirson, and Rozoy.

The official French report of October 24 says:

On October 23 observation planes, in the course of numerous reconnoissances, proceeded more than seventy kilometres (about forty-three and a half miles) inside the enemy lines. They brought back several hundred photographs. Two captive balloons were burned and twelve enemy machines were brought down or put out of action. The greater part of these successes were obtained in the region of the Aisne, where the vigilance of our pursuit machines was particularly exercised.

During the night our bombing machines dropped 14,500 kilos of projectiles on the railway station at Montcornet, Marle, Vervins, and Wassigny, with particular attention to Provisy, on which more than seven tons of explosives were dropped, causing several fires.

ITALIAN

On October 8 army and navy dirigibles, even though there was a strong wind, bombarded with great success the enemy's aviation fields and centres of concentration in the Trentino and on the Piave.

Great results were observed and numerous fires started as a consequence of the action. Our airships returned safely, notwithstanding the heavy fire from the enemy's anti-aircraft batteries.

On October 9 there was great aerial activity on all parts of the front. Many recognition flights and aerial combats. Our pursuit machines assaulted a large patrol of enemy machines which attempted to pass the battleline. Three were sent to earth and the remainder were compelled to retreat. Our bombing squadrons efficiently hit enemy trenches, cantonments and railroad stations, while special patrols, at a low altitude, fired by machine guns on columns of the enemy's soldiers marching to and from the front.

On October 10 bad weather, entirely adverse on all parts of the front, greatly reduced the aerial activity. Notwithstanding these conditions, numerous recognition and patrol flights were executed by our squadrons.

Naval machines at the front on the 10th and 11th accomplished with great results the bombardment of the Bay of Durazzo. All returned safely to their base.

On October 14, 15 and 16 bad weather hindered all aerial activity.

The Supreme Italian Command publishes the results of the aerial operations during the last part of September on our front.

Twenty-six enemy machines fell.

Eleven bombardments, during which 18 tons of explosives were dropped. More than 1,320 bombs of different calibre were dropped during the recognition flights.

Thirty-two thousand shots from machine guns were fired on enemy troops from special patrols at a low altitude.

Four thousand five hundred photographs of enemy positions were taken.

One million pamphlets were thrown inside hostile territory.

Long recognition flights were executed to Portogruaro, Cavazzo Carnieo, Tolmezzo, the Valley of Drava at Toblack.

Wright Monument in France to Be Near Where He Flew

Paris.—The French Aero Club Committee, which is arranging to erect a monument to Wilbur Wright, inventor of the aeroplane has decided to place it near the small village of Auvours, near Le Mans, where Wilbur Wright made his first flight in France on August 9, 1908. The monument will be erected next spring.

French Plane Builder Dies

Paris.—Leon Morane, the French aviator and aeroplane builder, is dead.

In 1910 Leon Morane earned the reputation of being the leading French aviator. In July of that year he established a new record for speed, and in September ascended 8,471 feet, at that time the greatest height ever attained by an aviator. He was injured in October, 1910, and afterward gave his entire attention to the building of aeroplanes.

Belgian Rulers Visit Bruges by Aeroplane

Dunkirk.—King Albert and Queen Elizabeth of Belgium visited Bruges by aeroplane on October 22.

They left Dunkirk at 8:45 o'clock in the morning and landed at Bruges a half hour later. They visited the chief streets of the city and received a joyful welcome from the populace.

On their return they left Bruges at 11 o'clock.

The Italian Trade

A large K. seaplane brought down at Venice quite recently is said to have two motors, acting on one propeller shaft. The machine is on view in that city, but illustrations of the craft are not very enlightening.

A new radiator, the Valcerusa, is coming very much to the front, several big engine builders fitting it. Among others the S. P. A. vertical motor on the S. V. A. is colled by a Valcerusa.

A Franco-Russian Alliance

M. Sikorsky, the designer and constructor of the giant biplane bearing his name, is now associated with the French Voisin Co., in the capacity of consulting engineer. It seems likely that he will devote himself to multiple-engined machines, and, considering his early entry into the field of large aeroplanes, the results of his experiments should be of interest.

Massachusetts Flyer with the British Is Reported Dead

Lieutenant John S. Ferguson of the British Royal Flying Corps, reported missing September 21, is now reported dead. Lieutenant Ferguson was twenty-five years old. He left Pittsfield, Mass., last spring and was commissioned in August. A brother, Lieutenant Thomas Ferguson, was killed while fighting with the British in April, and another brother, Andrew Ferguson, is overseas with a Canadian regiment.

In bombing the areas to the rear of the German lines the British aviators sent down one and one-half tons of bombs. The road was jammed with a mass of wreckage.

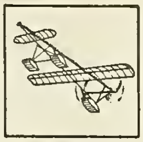
Germans Dread Winter and Raids By Allied Fliers

London.—A despatch to the Daily Mail from The Hague says: "From all information available here, in Germany there is a widespread dread of winter and of daily and nightly air raids from German aerodromes in Belgium, which are now in the hands of the Allies.

"It is indicated that such raids would produce internal results in Germany quite different from the present symptoms of unrest."

MODEL NEWS

Edited by John F. McMahon



Model Aeroplane Building as a Step to Aeronautical Engineering

Selecting A Wing Section

ONE of the problems of the Aeronautical Engineer is to pick the proper wing section for the machine he has under consideration. For a fast scout of light weight he must select a wing curve with a high ratio of lift to drift. This ratio is generally represented by the sign L/D.

Three wing sections, the first for a fast scout, the second for a medium fast machine and the third for heavy machines needing a great lift such as flying boats, will be found below. Also tables for each curve showing the coefficients of lift and drift (or resistance) at different angles of incidence of the wing from minus 4 degrees to plus 20 degrees are given, along with the ratio of lift to drift and the distance of the centre of pressure from the front edge of the wing at each angle of the wing.

The location of the centre of pressure in each wing section must be known, as the centre of gravity of the whole machine, and the centre of pressure must be in the same vertical line or as near to each other as possible.

The writer has selected these wing curves as they were designed to allow the use of large wing spars in the construction of the wing, which is desirable for the machine we are to build.

The formulae given herewith are put in for simplicity's sake. Though they look very difficult at first glance, the student will find that by looking closely at what the different symbols mean, the work is much simplified thereby.

Sustaining Power and Resistance of Wings

To figure the lift given by a wing we use the formula.

$$L = K_y\ AV^2$$

where Ky is the coefficient of lift at the angle of incidence, of the wing under consideration. A = the area of the wing in square feet and V^2 = the speed in miles per hour, squared.

For instance, we wish to find the lift of curve No. 1 at an angle of zero degrees having a wing area of 160 square feeet and traveling 120 miles per hour.

Substituting values for the above equation, we find alongside of 0° under Ky .000721, so we have

$$\begin{array}{cccc} L & = K_y & A & V^2 \\ \hline \text{Lift} & = .000721 & 160 & 120^2 \end{array} \text{ or}$$

multiplying, we have .000721 × 160 × 14400 = 1661 lbs. lift.

As the lift must be equal to the weight, it can be seen that the above would apply to a machine weighing 1661 pounds.

The resistance of this machine would be figured by the formula,

$$K_x A V^2$$

where Kx is the coefficient of resistance. Looking under Kx along a line with zero° angle, we find the coefficient at the angle to be .0000653.

Substituting values for the above, we have,

Resistance = .0000653 × 160 × 14400 = 150 lbs. approx.

Weight = Ky AV^2, or the same as for lift.

$$K_y = \frac{W}{AV^2} \text{ or}$$

weight of machine, divided by the area, times the velocity squared.

The above equation can be used in determining the angle needed to sustain the machine at the lowest flying speed, or to ascertain the angle to set the wings to give the proper lift at full speed. For instance, we found the speed of 120 M.P.H. necessary to sustain the machine with an angle of zero degrees. Suppose we wanted the machine to have a minimum or slow flying speed of 60 M.P.H.; then, substituting values for the equation, we have

$$K_y = \frac{1661}{160 \times 3600} \text{ or } 1661 \div 2304000 = .002883$$

Looking at the table of Ky, we find this to be near 12 degrees, or roughly, 11 degrees 30 minutes. Then, in order to fly this machine at a speed of only 60 M.P.H. the pilot would have to drop the tail to give the wings an angle of incidence of 11 degrees 30 minutes to maintain horizontal flight.

Another equation for use in determining the speed a machine would have to make in order to fly is

$$V = \sqrt{\frac{W}{K_y A}} \text{ substituting values} \sqrt{\frac{1661}{.000721 \times 160}} \text{ or simply}$$

$$\sqrt{1661 \div (.000721 \times 160)} = 120 \text{ M.P.H.}$$

Again to find the area if we know the weight, speed and the

$$A = \frac{W}{K_y\ V^2} \text{ or}$$

Suppose we wanted to find the area needed for an angle of 10 degrees at a speed of 60 M.P.H.

Looking in Ky column we find opposite 10 degrees coefficient .002580, substituting values in the formula, we have

$$\text{Area} = \frac{1661}{.00258 \times 3600} \text{ or } 1661 \div 9.288 = 175.6 \text{ sq. ft.}$$

The student will see that a wing gives more lift as the angle increases until the critical or highest angle of lift, called the (burble) point is reached.

After this angle is reached the lift drops and the resistance increases.

As the lift increases with the angle, so the resistance increases.

(To be continued)

Aerodynamic Laboratory Tests

U. S. A. 1.

L of i	K_y	K_x	*L/D*	Distance of C. P. from leading edge, in fractional part of chord.
—4°	—.000399	.0001515	2.64	....
—2°	.000156	.0000905	1.72	....
—1°	.000432	.0000700	6.15	.620
0°	.000721	.0000653	11.00	.530
1°	.000936	.0000670	14.00	.463
2°	.001146	.0000688	16.60	.415
4°	.001510	.0000860	17.50	.340
6°	.001878	.0001158	16.20	.316
8°	.002230	.0001558	14:30	.303
10°	.002580	.0002055	12.60	.290
12°	.002910	.0002595	11.20	.283
14°	.003165	.0003040	10.40	.274
16°	.003165	.0003710	8.50	.276
18°	.003080	.0005520	5.60	.310
20°	.002882	.0008500	3.40	.360

U. S. A. 3.

L of i	K_y	K_x	*L/D*	Distance of C. P. from leading edge, in fractional part of chord.
—4°	—.000506	.0001589	—3.19	....
—2°	.000420	.0001052	3.99	.676
—1°	.000692	.0000845	8.20	.482
0°	.000928	.0000835	11.10	.403
1°	.001123	.0000856	13.10	.353
2°	.001310	.0000889	14.75	.323
3°	.001508	.0000893	16.16	.295
4°	.001704	.0001073	15.88	.280
5°	.001919	.0001180	16.18	.260
8°	.002520	.0001823	13.82	.230
10°	.002905	.0002290	12.70	.220
12°	.003160	.0002830	11.15	.208
13°	.003235	.0003142	10.30	.204
14°	.003240	.0003410	9.50	.197
15°	.003215	.0003780	8.50	.197
16°	.003155	.0004460	7.02	.197
18°	.003125	.0006620	4.73	.336
20°	.002889	.0008570	3.37	.266

U. S. A. 4.

L of i	K_y	K_x	*L/D*	Distance of C. P. from leading edge, in fractional part of chord.
—4°	—.0001231	.0001640	—0.75	....
—2°	.0005200	.0001150	4.52	.670
—1°	.0007650	.0001078	7.11	.525
0°	.0009750	.0001032	9.44	.461
1°	.0011840	.0001002	11.80	.416
2°	.0013820	.0000995	13.90	.388
4°	.0017700	.0001115	15.88	.347
5°	.0019800	.0001340	14.80	.330
8°	.0025600	.0001900	13.50	.298
10°	.0029900	.0002555	11.70	.273
12°	.0033100	.0003100	10.67	.276
14°	.0036000	.0003545	10.15	.276
16°	.0036150	.0004430	8.15	.276
18°	.0034700	.0005580	6.22	.303
20°	.0031000	.0007640	4.06	.335

L of i = Angle of wing chord to wind.

Ky = Lift coefficient in lbs./sq. ft./MPH.

Kx = Drift coefficient in lbs./sq. ft./MPH.

L/D = Ratio of lift to drift.

Aeronitis is a pleasant, a decidedly infectious ailment, which makes its victims "flighty," mentally and physically. At times it has a pathologic, at times merely a psychologic foundation. It already has affected thousands; it will get the rest of the world in time. Its symptoms vary in each case and each victim has a different story to tell. When you finish this column YOU may be infected, and may have a story all of your own. If so, your contribution will be welcomed by your fellow AERONUTS. Initials of contributor will be printed when requested.

A Tiny Tale Spun by the Housewife

To market to market
We hire a jit.
Wait forty minutes,
Then lickety split.

Over the roadway
Careening we go!
Even the airplanes
Seem placidly slow.

Faster and faster
We skid round the bend—
Yonder's a bridge—Oh,
Can this be the end?

Riggety jiggety,
Pop goes a tire!
List to that chauffeur's
Magnificent ire.

In again, on again,
Feeling quite pale;
Missing a cow
By the hair of her tail!

Racing with trolleys
And trucks—and a cop;
Hitting the high spots
A terrible flop.

To market to market
We hire a jit—
But do we return in it?
"Je vous dis"——NIT!

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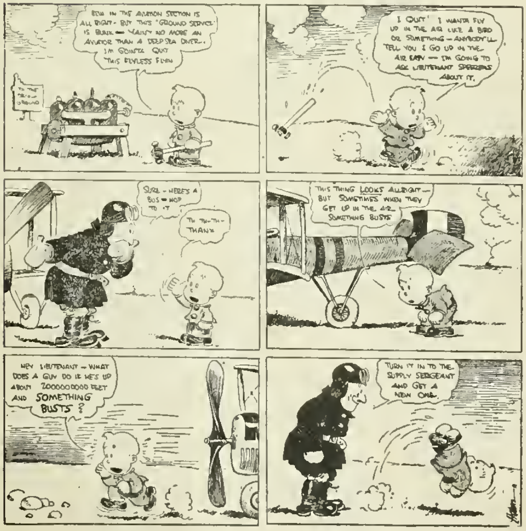

BEIN' IN THE AVIATION SECTION IS ALL RIGHT - BUT THIS "GROUND SERVICE" IS BUNK — I AIN'T NO MORE AN AVIATOR THAN A DEEP SEA DIVER — I'M GOINTA QUIT THIS FLYLESS FLYIN
I QUIT! I WANTA FLY UP IN THE AIR LIKE A BIRD OR SOMETHING — ANYBODY'LL TELL YOU I GO UP IN THE AIR EASY — I'M GOING TO ASK LIEUTENANT SPEERINS ABOUT IT.
SURE - HERE'S A BUS - HOP TO IT
TH-TH-TH-THANK
THIS THING LOOKS ALLRIGHT — BUT SOMETIMES WHEN THEY GET UP IN THE AIR SOMETHING BUSTS
HEY LIEUTENANT - WHAT DOES A GUY DO IF HE'S UP ABOUT 2000000000 FEET AND SOMETHING BUSTS?
TURN IT IN TO THE SUPPLY SERGEANT AND GET A NEW ONE.

Courtesy Evening Journal.

The Insignia

The lieutenant was testing the squad in visional power. "Tell me, No. 1," he said, "how many men are in the trench-digging party over there?"

"Thirty men and one officer" was the reply.

"Quite right. But how do you know one is an officer at this distance?"

"Cos he's the only one not working."

—Ex.

Aerodonetics

(With Apologies to the White Knight or Somebody.)

'Twas solo and the ailerons
Did flit and flutter in the wake.
Too flimsy seemed the longerons
And the instructor outspake—

"Beware too level banks, my son,
The side slips and the other sins.
Beware the uppish stalls and shun
The dangerous tail spins."

He took his Curtiss ship in hand
And long the Figure 8 he sought.
Then rested sick on the trembling stick
And glided deep in thought.

And as in pannish thought he slid,
Rip-roarin' Texas, full of sand,
Came huffling on the nervy kid
And blew to beat the band.

One, two, three, four, and more and more
His spinning plane went blither block.
He hit the sward and in the Ford
He beat it for the Doc.

"And hast thou busted up the ship?
Back to the bench, thou monkey cage!
Oh, frowsy dub! Thou—blank—glub—glub—"
He stuttered in his rage."

'Twas solo and the ailerons
Did flit and flutter in the wake.
Too flimsy seemed the longerons
AND the instructor outspake! ! ! ! !

—Lieut. L. B. C.

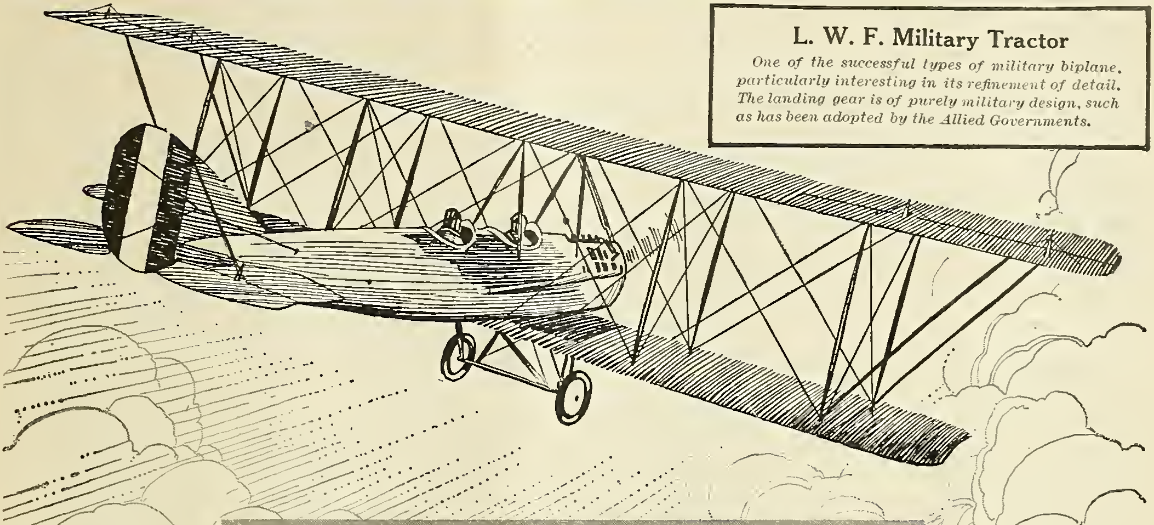
Documents Lost!

LOST—One address. Will the conductor that took up transportation tickets on Sunday night's Cognac Express kindly look through his pockets and see if he was given the address of a Parisien mademoiselle instead of a night pass. Reward: Beau coup gratitude and Y. M. cigars. No questions asked or answered. Pvt. Zig-Zag, care, Plane News. t.f.

Slinging the Old Stuff

"A state of enhanced protection" is the new German name for martial law. "What do you read, my lords?" Words words, words!—*Daily Times.*

And bull, bull, bull!



L. W. F. Military Tractor

One of the successful types of military biplane, particularly interesting in its refinement of detail. The landing gear is of purely military design, such as has been adopted by the Allied Governments.

VALENTINE'S
VALSPAR
The Varnish That Won't Turn White

Valspar aids Airplane Efficiency

Valspar is the ideal varnish for airplanes and seaplanes in active service, because it is proof against water and weather, oil and gasoline, and the extreme vibration of the engine and machine-gun.

Valspar protects wood, metal or fabric with a coating of unsurpassable toughness and elasticity. It will neither blister, check, crack, nor turn white from exposure.

Valspar resists also the destructive effects of high speed and hard usage, and retains its protective qualities long after ordinary varnish requires renewal.

Valspar is in constant use in the air service of the Allies and has satisfied their most exacting requirements.

Our Airplane Department will gladly afford information and assistance in solving your varnish problems. To purchasing agents and superintendents of production we will send our book on airplane finishing free on request.

VALENTINE & COMPANY, 456 Fourth Avenue, N. Y.

ESTABLISHED 1832—Largest Manufacturers of High-grade Varnishes in the World

New York Chicago TRADE VALENTINES VARNISHES MARK Toronto London
Boston Amsterdam

W. P. FULLER & CO., Agents for the Pacific Coast: San Francisco and Principal Pacific Coast Cities

Valentine Products used by the world's leading airplane-makers include Valspar Varnish, Valspar Bristol Enamel, Valspar Low Visibility Gray Enamel, Valspar Olive-Drab Enamel, Valspar Black Enamel, Valspar Filler (Wood), Valspar Primer (Metal), Valspar Primer (Wood), Valspar Khaki Enamel, Valspar Aluminum Paint. Dipping, Spraying, and Brushing coatings of all kinds, Quick-Drying Insignia Colors.

(*Continued from page* 431)

Gregory, Ralph Lester..........SLA; SAG
Garrett, Pearson B..........CPA
Gray, Ralph Monzingo..........SLA; PMT
Gahris, Leroy E......CUI; DMA; LHV; Note 1
Gould, Theodore John..........SLA
Gower, John Maurice..........SLA
Grimes, Plumer William..........SLA
Green, Henry Oliver..........SLA
Glose, Charles William..........SLA
Gemmill, William B..........CJW
Gibbons, John R..........SMM
Giffels, Raymond F..........CGC
Genung, Arthur Lawrence..........SLA; PMT
Goodrich, Augustus..........CFT
Giroux, Louis A..........DMA
Grover, Ralph J..........DMA
Gilbert, Francis M..........AGC
Gihson, Peyton..........CGC
Garrett, Kenneth..........CGC
Gerke, Walter H..........EOT
Gilchrist, Claude F..........CAF

H

Hill, William Burr, Jr..........FLA
Heard, Charles Richard..........SLA;SAG
Hosking, Oakely William..........SLA; SAG
Horton, Clarence Frost..........SLA; KST
Harvey, Harold Williamson..........SLA; GLC
Heisner, Charles Lester..........SLA; CFT
Hart, Charles Whittlesey..........SLA; SAG
Hartsough, Ralph Clayton..........SLA; SBI
Hihner, Harold Wellington..........SLA; PMT
Hoddick, Arthur H..........FLA
Heckert, Sidney F., Jr..........FLA
Heebner, Miller Beekman..........FLA
Hilliard, Walter Bertran..........FLA
Hamor, Bert Lee..........SLA; PWM
Harp, John Holland..........SLA; CWT
Hoare, J. Maurice..........SLA; KST
Hoffman, Henry Allen..........SLA; GLC
Hersey, George F..........CJW
Hamlin, Charles Evelen..........SLA; PWM
Hill, Maurice Benjamin..........SLA; PWM
Haugen, George Arnold..........SLA; PWM
Hill, John Calvin, Jr..........SLA; PWM
Hall, Loring Howes..........SLA; ABC
Harvey, Henry Steven..........SLA; LHV
Hohbs, John Edward..........SLA; ELA
Hoatson, Thomas Lewis..........SLA; ELA
Hill, James Moore..........SLA; ELA
Hart, Haden Bourland..........SLA; SBI
Hajek, William J..........FRF
Hopkins, Hiram Culver..........SLA; BFT
Hagerty, William Joseph..........SLA; CRI
Hunter, Daniel Franders..........SLA; CWT
Harding, Roland R..........TFT
Hessey, John H..........TFT
Holderman, Lester Dale..........SLA; PMT
Henderson, Finley D..........BST
Hitchcock, Harry Coverly..........SLA; SBI
Halley, Samuel Russell..........CPA
Hammes, John Safford..........SLA; CWT
Hastings, Edgar Roswell..........SLA; CWT
Howard, John Clough..........SLA; PWM
Harold, Eugene Leslie..........SLA; PWM
Hughes, George F..........CPA
Heyniger, C. Lambert..........CPA
Hollander, Cyril M..........LHV
Harmon, Roy William..........SLA; SAG
Hambleton, John A..........CPA
Herlihy, John A..........CPA
Herbert, O. Haswell..........CPA
Hill, George R..........CPA
Halstead, John E..........FLA
Hopkins, Mark..........FLA
Hunter, Thomas Caborne..........SLA; ELA
Henn, John Ervin..........SLA; PWM
Hackett, Chauncey..........CPA
Hagan, Thomas H..........CGC
Hinkle, Stacy C..........CGC
Harrell, Samuel C..........AGC
Hall, Russell F..........MIA
Hurst, Edward..........Note 5
Hall, Frank Loomis..........FLA
Hawks, Harold Phelps..........FLA
Hoffman, Verne W..........CGC
Harrison, Benjamin Demas..........SLA
Horton, Hiram T..........MIA
Hull, Perry Albanis..........SLA
Hadenfelt, Charles O..........SMM
Holmes, Walter E..........SMM
House, Archie F..........SMM
Hartman, Harrison J..........ELA
Herington, George B..........CPA
Hihbitt, George W..........EOT
Hunt, Robert McMurray..........SLA; VBW
Hare, Herbert Roy..........Note 4
Hanna, Charles G..........Note 5
Hooper, Willis B..........CGC
Higgins, Louis S..........Note 2
Hovey, Dana W..........DMA
Hodous, Louis Wenceslaus..........SLA; DMA
Harris, Frank D..........PWM
Hyde, Clarence E..........CGC
Harmon, Roy W..........CGC
Herron, Robert M., Jr..........CGC
Hill, Hartwell C..........CGC
Heppeard, Thomas H..........PWM
Henry, William H..........MIA
Henderson, Randall T..........KST
Hutchinson, William B..........RSD
Heisner, Charles L..........CGC
Hawkinson, John L..........TFT
Hennessey, James Roy..........SLA; CWT

I

Inglis, Henry Baxter..........CPA
Ives, Earl E..........FLA
Isaacs, Charles W., Jr. ....TFT

J

Johnson, Edward Lee..........PWM
Johnson, Walter Ellsworth..........SLA; BST
Johnson, Arthur Walfred..........CPA
Johnston, Waldo C..........CPA
Jones, Lloyd T..........CPA
Jones, George Lewis..........MJA
Jones, E. Lester..........CLA
Jones, Earl Chester..........SLA; ABC
Jackson, Samuel Dorsey..........SLA; PMT
Jackson, Ralph Lewis..........SLA; KST
Jorstad, Jonas O..........CPA
Joy, William Patrick..........FLA; HHN
Jenkins, Benjamin F..........CGC
Jones, Harrison Morton..........MJA
Jones, Arch James..........ABC
Jenkins, Nelson D..........AGC
Johnson, Jerome B..........CGC
Jones, William L., Jr..........CGC
Jacobs, George S..........SMA
Jones, Martin Tilford..........SLA; HHN
Johnston, Edward M..........CGC
Joscelyn, Douglass L..........AGC

K

Knoeppel, Charles Justus..........SLA; PMT
King, Edward H..........BST
Kleinkuecht, Clifford Carl..........SLA; TFT
Koenig, Augustus George..........SLA; CFT
Klotz, Dominic George..........SLA; KST
Kelting, Aubrey North..........SLA; AAD
Kiernan, James Ives..........SLA; ABC
Knauff, Calvin Nicholas..........SLA; PWM
Kelley, Joseph John..........SLA; SAG
Kiley, Richard James..........SLA; BFT
Kinkade, Kennish C..........TFT
Koontz, Leonidas L..........FLA
Kidd, Clifford Manzer..........SLA; SBI
Kelly, Fred Raymond..........SLA; AAD
Kemper, Ralph Thomas..........SLA; PWM
Kelley, Earl C..........TFT
Kellogg, Stuart W..........CPA
Kenyon, William S..........CPA
Kicklighter, Harman K..........CPA
King, John Andrews ....CPA
Knight, Everett Samuel ....SLA
Kendrick, Frank Elwin ....SLA
Kaufman, Godfrey F..........CGC
King, William G..........CGC
Kaplowitt, Mack B..........MIA
Kuhn, Herbert Roy..........SLA; CWT
Keene, Charles W..........Note 2
Kennedy, James A., Jr..........CGC
Kelly, James N..........CGC
Kilander, Carl Franklin..........PMT
Kunkel, Henry W..........AGC
Kern, Ralph D..........CGC
Kline, Lawrence J..........CGC
Kelly, Fred W..........CGC
Kiely, Michael A..........DMA
Korteling, Ralph G..........SMM
Kendall, John D..........CGC

L

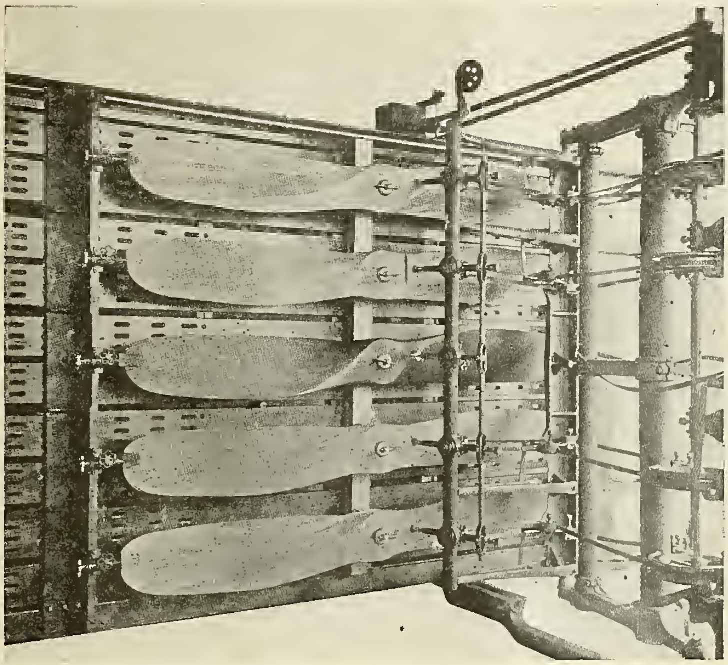
Lankford, Frank E..........SRC
Lake, William F..........FLA
Lewis, Tracy H..........FLA
Lamson, Leon L..........CGC
Langin, James Joseph..........SLA; SBI
Langley, George Julius..........SLA; SAG
Lyster, Arthur Frederick..........SLA; CGC
Leeds, Ralph J..........KST
Labaree, Leonard Woods..........SLA; ABC
Lockhart, William Albert..........SLA; VBW
Lang, Lloyd Talbott..........SLA; SBI
Lynch, John Joseph..........SLA; CWT
Longinotti, James Louis..........SLA; PWM
Lyle, Donald ....CPA
Loeblein, John Merkel..........FLA
Leigh, Kenneth Glenmore..........SLA; PWM
Lucas, Donald Teale..........SLA; ELA
Little, James L..........CPA
Lyon, Charles Sidney..........CPA
Lagen, Marc A..........CPA
Lipscomb, McDonald E..........CGC
Lawson, John Theodore..........SLA; SAG
Lewis, William E..........MIA
Lee, George F..........Note 13
Lantz, Lyman Southard..........SLA
Levy, Charles Henry..........SLA
Lackey, Myron Elmo..........SLA
Lomax, Thornton G., Jr..........AGC
Lorenz, Harold A..........AGC
Lantz, Lyman S..........RSD
Lingle, David Glenn..........SLA; LHV
Lewis, Orman J..........TFT
Lundell, Floyd A..........TFT
Leopold, Joseph ....LHV
Lewis, Raymond C..........BST
Lawhon, Guy B..........TFT
Leeth, Herman B..........MIA

M

Miller, Henry J. F..........AGC
Martin, William, Jr..........SLA; SAG
Millard, Henry Ray..........SLA; ELA
Moffett, George Gilbert..........SLA; GLC
Mueller, Charles Paul..........SLA; KST
Morrow, W. H. ....DAP
Miller, Harry A. ....CPA
Meredith, James E. ....CPA
Merriman, Frederic ....FLA
May, Woodward James..........SLA; PMT
Molleson, Gilbert Cox..........CPA
Marberry, Jason M..........TFT
Moise, Harold ....TFT
Mathews, Leo Ambrose..........SLA; PWM
Mears, Mortimer W..........EOT
Morley, Maynard W..........SLA; AAD
Morlan, Frederick H..........CPA
Morton, Charles I. ....FLA
Muse, Donald Patrick ....CPA
Meyer, Henry Fred..........SLA; ELA
Moon, Harold F. ....PWM
Murphy, Joseph A. ....PWM
Middleton, Ray T. ....CPA
Murray, Harry Eugene..........SLA; PWM
Munz, Hugh Earl ....SLA; CWT
Moore, Walter F. ....CGC
Morse, Daniel P., Jr..........CPA
Moore, Samuel T. ....CPA
Miller, Francis Hukill ....FLA
Matteson, Alfred Simmons..........SLA; PWM
Mitchell, John ....CPA
Marquette, John J..........BST
Marvin, William G..........FLA
Morrow, John, Jr. ....SLA; PWM
Moses, Leonard ....SLA; PWM
Mallers, John Bernard..........SLA
Manau, Fred Anthony ....SLA
Marshall, Norman Harold..........SLA
Martin, Pardoe ....SLA
Mell, Robert Emerson..........SLA
Miller, Harold John..........SLA
Moore, Percy Samuel..........FLA
Mills, Charles F. ....Note 9
Miller, Edward A. ....Note 11
Murray, Albert Francis..........FLA; SMA
Madden, Edward Charles ....SLA
Maddox, Glen J. ....SLA
Martin, Ernest D. ....SLA
Miller, Tom Barry..........Note 4
Morris, Edward S. ....EOT
Martin, Thomas Russell..........SLA; CWT
Morgan, Louie Robert..........SLA; PMT
Morrow, Thornton Court ....SLA; LDT
Metcalf, Frank ....CGC
Marmouget, James A. ....CGC
Millard, Henry R. ....CGC
Murphy, Maurice H. ....CGC
Magruder, Abbey W. ....AGC
Moon, Ruthyan K. ....AGC
Monger, Walter Victor..........SLA
Miles, Paul K. ....Note 15
Mullowney, John Julian..........SLA
Mansfield, Edward G. ....CGC
Maas, George J. ....CGC
Morrison, Lawrence P. ....CGC
Miller, Charles W. ....CGC
Miller, James C. ....CGC
Marshall, Craig W. ....CMV
Marmouget, James Albert..........SLA; ELA
Mucke, Henry C. ....EOT
Mayfield, Mercer B. ....Note 3
Montgomery, James N. ....CAF
Mueller, Charles P. ....BST
Mack, Donald L. ....AGC
Mathewson, Samuel A. ....SMM
Mills, Raymond Tower..........SLA; PWM
Muncie, Floyd Harold ....SLA; PWM
Mohr, James Harvey ....FLA
Martin, Reuel ....SLA; ELA
Mackall, John C. ....PWM
Mennies, Michael ....IMA
Meehan, William S. ....PWM
Monypeny, William Walter..........SLA; SAG
Mulliken, Harrall ....MJA

Mc

McClelland, Harold M. ....AGC
McLaughlin, John Edward..........SLA; SAG
McDaniel, Yancey Clarke ....SLA; FOB
McCormick, Cyrus, Jr..........FLA
McLean, George Wheeler..........FLA
McIver, Stephens ....CPA
McMillin, Byron Dudley ....SLA; CWT
McGill, Robert B. ....CPA
McRoberts, Horace Edward..........SLA; CWT
McClymonds, James Douthett..........SLA
McPherson, Andrew Frank..........SLA
MacIlwain, William Henry..........SLA
McKinnon, John Harrison..........SLA
McKay, George Hugh..........SLA; SBI
McLachlen, Lanier P..........CPA
McGill, Raymond Joseph..........SLA; PWM
McEvers, Ernest ....CWT
McCormack, Victor A. ....BST
McLeod, Alexander ....CPA
McMcCawley, John H. ....CPA
McNees, Joshua McKinley..........SLA; CWT
McCrady, Edward ....SLA; PWM
McFarland, Allan P. ....CPA
McKinstry, Augustus Tremaine....SLA; PWM
McElroy, Paul Elliott..........SLA; FLA
McWilliams, Gerald Shearn..........SLA; PWM
McKean, Henry Pratt ....CPA
McCue, John B. ....MIA
McLeoad, Norman Zenos..........SLA; CFT
McKiernan, William ....SLA
McClintock, Ralph Alonzo..........SLA; KST
McCree, Robert Donald..........SLA; CWT
McAndrew, Alexander ....CPA
McCloy, Dixon E. ....KST
McCarn, Clarence G. ....Note 5
MacCammon, John M. ....CMV
McCaughey, Harold Scott ....SLA; CFT
McDarment, Corley P. ....CGC
McKee, Stuart ....CGC
McCarron, Henry A. ....MIA
McNamara, Laurence J..........CGC
McGurl, Gilbert Vincent..........SLA; ABC
Merrell, George Robert, Jr..........SLA; PWM
McGraw, Leroy E. ....ASM
McClure, Samuel M. ....CGC



The Curtis Dreadnaught Propeller Cutting Machine, Model 55

THIS machine cuts four blades at a time, and cuts closer and more accurate than any other machine in the market.

It finishes the hub the same as all other parts of the blade.

It cuts with the grain of the wood.

It does not require a metal model; just a regular stock blade is sufficient.

It does not bump over the pattern.

It is manually operated, which gives it the advantage of the human touch required on accurate work.

The hand work required after this machine is from 3½ to 4½ hours on each blade.

It leaves just enough wood for cleaning up.

Curtis Machine Corp.
Jamestown, N. Y.

McKinnon, Angus G.	EOT
McMullen, Clements	AGC
McMorrow, William Francis	FLA
McGowen, George J.	AGC
McCabe, John E.	CGC

N

Nunn, James D.	DIK
Neville, Ralph Milton	SLA; FOB
Nielsen, Andrew J.	TFT
Nolte, Julius M.	TFT
Norlin, Charies E.	FLA; IMA
Newman, Irving Thomas	SLA; RWT
Northrop, Marvin Almeric	SLA; SBI
Noyes, Stephen Henley	CPA
Nelson, Roy A.	EOT
Nilson, Harry B.	RSD
Nowland, Paul J.	FLA
Nutt, Clifford Cameron	FLA
Norton, William K.	CPA
Neal, Turner B.	CPA
Noyes, Daniel Raymond	CPA
Neal, Byron Wilkenson	SLA
Newhury, Joseph Benjamin	SLA
Newhouse, Sewell Omer	SLA; PWM
Newland, Philip J.	AAD
Netting, Charles Louis	SLA; SAG
Newton, Arthur Gove	MJA; Note 12
Nabours, James C., Jr	KST
Nordholm, Leon Emery	SLA; SBI
Noland, Raymond Richard	SLA; PWM
Nelson, Martin A.	SLA; PWM
Neff, Harry G.	ECT
Nunn, Richard E.	PWM
Niblack, Polk H.	CGC

O

Orr, Arthur	CPA
Overly, Harry R.	LDT
Osgood, James Whitman	CPA
Olmstead, Rossiter David	SLA; PWM
Otto, Thomas Osgood	SLA; SAG
O'Connell, Jack Joseph	SLA; CFT
O'Connell, Frank L.	FLA
O'Melveny, Stuart	FLA
O'Brien, Bernard Joseph	SLA; PWM
O'Connor, Joseph Paul	SLA; ELA
O'Brien, Matthew H.	CGC
O'Neil, John Francis	ABC
Older, Fred R.	AGC
Oliver, Herbert Gladstone	SLA; AAD
Olsen, Luther H.	PWM
Ober, George B.	CGC
Osmund, Robert Hunter	SLA; PWM

P

Pearsall, Chester Burdick	SLA; SAG
Parmenter, LeClare F.	EOT
Pease, Jack J.	EOT
Pettis, Edward Valentine	SLA; CWT
Pourron, Joseph F.	MJA
Phelps, Edward G.	TFT
Pritchett, Frank Edward	SLA; PWM
Porter, Joseph Logston	SLA; ABC
Potts, Joseph Johnston	SLA; CFT
Pillshury, Edwin S.	CGC
Pollock, Robert E.	CGC
Parker, Earl Kenneth	SLA; ELA
Pell, Clarence C.	AGC
Perry, Irving	SLA; TMA
Parish, George Edward	SLA; ABC
Palmer, Clarence W.	CPA
Perry, Donald Irving	SLA; ELA
Phillips, Wendell	SLA; ELA
Pendleton, James D.	FLA
Price, Harlow Russell	FLA
Peterson, Elroy Gunnar Emanuel	SLA; ABC
Proctor, John Francis	FLA; IMA
Porter, Harry Bigelow	PWM
Pillshury, Charles S.	CPA
Pogue, Harold Austin	SLA; ABC
Pierce, Dele F.	LDT
Post, Edwin M.	CPA
Prentice, James	CLA
Parmenter, Le Clare Fall	SLA; PWM
Prince, Earl Powell	SLA; PWM
Payson, John Brown	SLA; PWM
Pfiester, Henry J.	CPA
Pink, Louis P.	FLA
Pierrepont, Rutherford Stuyvesant	CPA
Price, Arthur Lowell	SLA; FLA
Pearce, Ronal H.	FLA
Paris, Samuel H.	FLA
Paine, George Eustis	FLA
Perry, William G.	CPA
Payne, Byran W.	CGC
Peace, Harley M.	CFT
Pulver, Seth Q.	FLA; IMA
Prentiss, Paul H.	MIA
Pitkin, Joseph Lovell	FLA; IMA
Patterson, John F.	IMA
Parsons, Clyde H.	CGC
Pettingell, Raymond R.	CGC
Platt, Harold L.	CGC
Pollard, Alfred L.	CGC
Poore, Owen P.	CGC
Pingree, John, Jr.	Note 4
Peterson, James Andrew, Jr.	SLA; CWT
Pardee, James Lee	Note 8
Patterson, James McKnight	SLA; ELA
Pfirrman, Ernest James	SLA; IMA
Paschall, Winfred Eugene	SLA; SRC
Parker, Kenneth H.	EOT
Pfau, George Harold	FLA
Panton, Howard R.	SMM
Pugh, Roy L.	SMM
Phelps, Samuel B.	CAF

Q

Queal, William Nelson	FLA; HHN
Quirt, Harold W.	CGC

R

Ryan, James Francis	SLA
Ryan, William F.	IMA
Rohertson, Hugh	SLA
Roherts, Arthur M.	FLA
Rowley, William Perry	SLA
Reeves, Charles H., Jr.	CGC
Reagan, Oliver Edward	FLA
Ramey, George E.	FLA
Rhoads, Rohert Blee	FLA
Ronan, Arthur Thomas	SLA; DAP
Rowell, Fenton Charles	SLA; CWT
Rider, William Norris	SLA; CFT
Reid, Ted	SLA; PWM
Raid, Theodore Shyghighon Knoles	SLA; PWM
Ramsey, Joseph Walter	CPA
Rozene, Arthur Emanuel	SLA; SBI
Raher, Edward McGrew	SLA; CFT
Rodger, Raymond John	SLA; CFT
Rider, Nelson Willard	SLA; TMA
Ritterhusch, Walter Henry	SLA; ELA
Ruh, Donald O.	SMM
Russell, Selwyn Emerson	SLA; PWM
Rice, Nelson Phelps	SLA; PWM
Rickenbacker, Edward V.	CPA
Reynolds, Clearton H.	CPA

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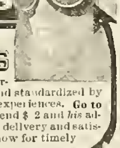

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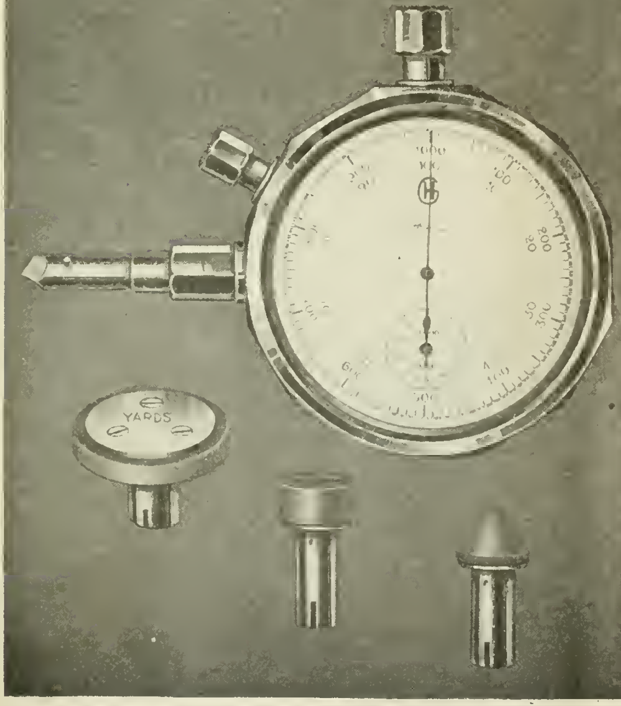

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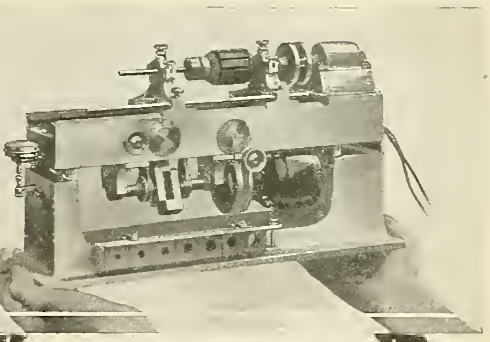

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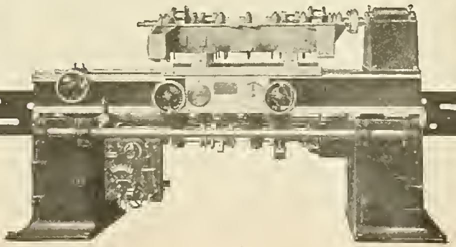

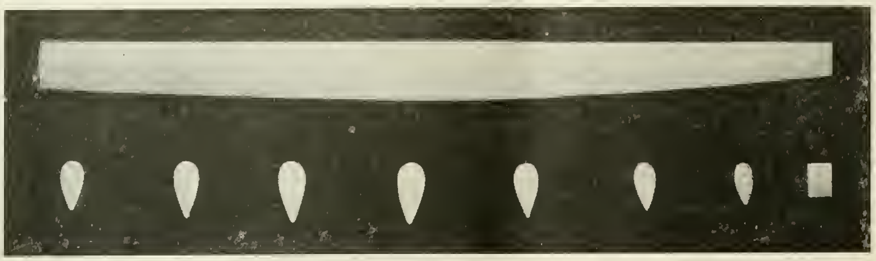

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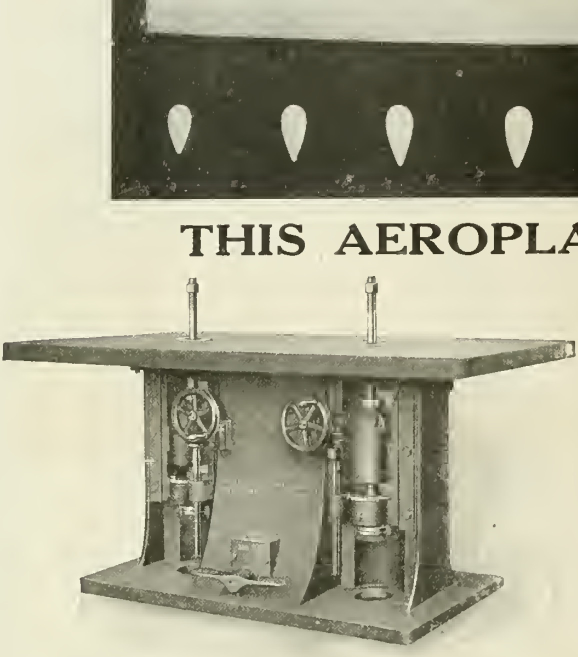

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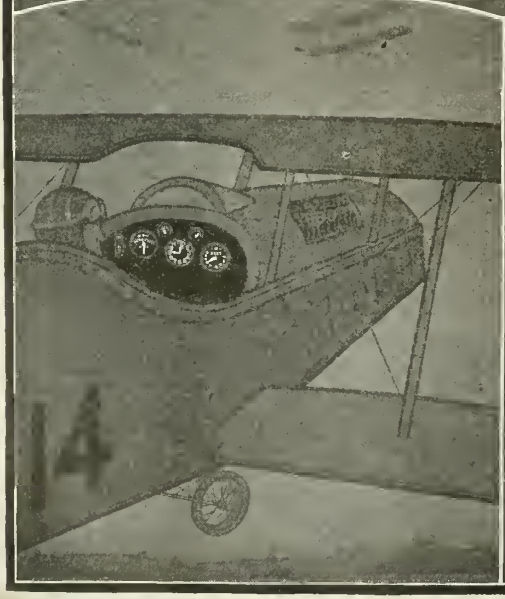

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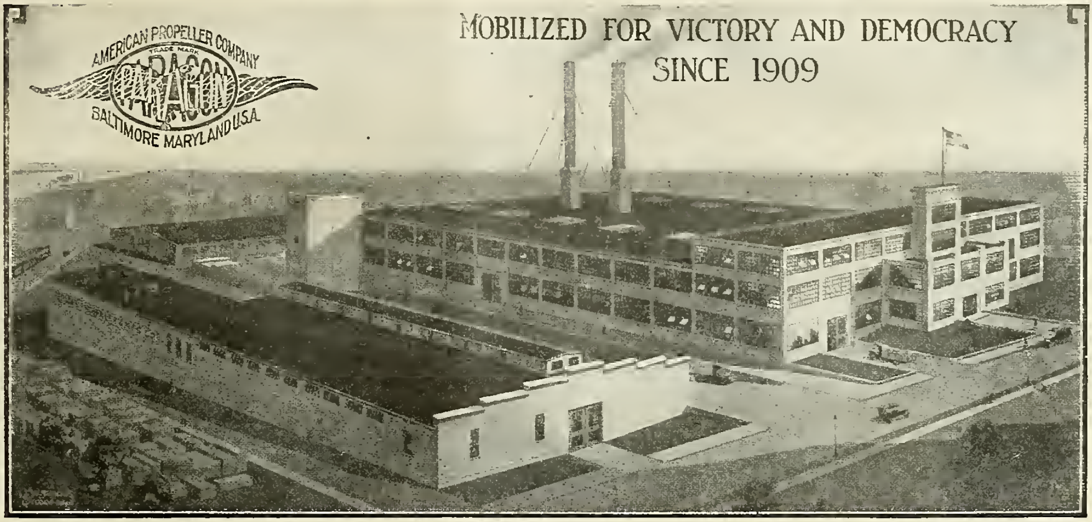
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Rogers, Emery Herman......FLA
Rollins, Joseph R......CUI; LHV; Note 1
Riley, Joseph Edward......SLA; KST
Roger, Raymond L. ......CGC
Reece, Henry Emerson ......CPA
Rotan, George Vallandigham......CPA
Roberts, Carroll H. ......CGC
Rank, Levin ......IMA
Reierson, Gustav ......SRC
Reid, William Herbert Eddy......SLA; TMA
Roddie, James Alexander Bostic......SLA; CFT
Raimey, John Robert......SLA; PWM
Rambo, Ross Curtis ......ABC
Roller, Duane E. ......SMM
Ringer, Albert R. ......AGC

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Smith, Maurice R. ......CPA
Shappell, Maple Delos ......CPA
Smith, Arthur H. ......CGC
Sheldon, Frederick Henry, Jr......SLA
Simons, LeRoy Simeon......MJA
Somers, Paul E. ......BST
Simons, Henry H. ......CPA
Stevenson, Joseph H. ......CPA
Scott, Grant Elbert ......FLA
Slattery, Frank Earl ......FLA
Seeley, deBenneville Keim......CPA
Sanhorne, Paul Fitch......FLA
Sampter, E. Lawrence......FLA
Shaffer, William L......FLA
Simerman, George Andrew...... ......FLA
Simpson, William Dudley......FLA
Slattery, John William......FLA
Scarritt, Daniel de Rochehlave....SLA; PWM
Spencer, Raymond Cleveland......SLA; PWM
South, John Claybourne......SLA; PWM
Stone, Harry Donald......SLA; PWM
Saunders, Walter LeRoy......CPA
Sutton, Harry Allen ......CPA
Spain, William W. ......CPA
Smith, Granville M., Jr......CPA
Soule, Arthur Logan......PWM
Shaffer, William L. ......CGC
Simpers, Robert Sherman......MJA
Stetson, John B., Jr......CPA
Scouton, Harry Edwin......SLA; PWM
Sweet, Milo Jasper......FLA; VBW
Strum, Elmer Augustine......SLA; KST
Stubblefield, Blaine......SLA; KST
Sanderson, James Windle......SLA; SAG
Stoops, Earle Elmer......SLA; KST
Shepard, Lynn Crawford......SLA: ELA
Shepherd, John E. ......KST
Sona, Peter ......KST
Smith, Charles R. ......KST
Smith, Lowell H. ......AGC
Sackett, Charles R. ......EOT
Stimson, George W. ......FLA
Seeligson, Lamar G. ......BST
Sanderson, James W. ......BST
Shaper, Henry F. ......BST
Swedherg, Ernest William......PWM
Seaver, James Daniel ......PWM
Simpson, William T. ......LHV
Skinner, Richard D. ......CPA
Savage, Charles M. ......CPA
Snyder, John H. ......FLA
Spencer, Edward James......SLA; SBI
Stephens, Albert Edward......SLA; RWT
Saunders, Edward Roberts......SLA; PWM
Sleeper, Gordon C......FLA
Shimmon, Joseph M. ......FOB
Studler, Rene R. ......BST
Spiegel, Edward R. ......CPA
Schoen, Ernest R. ......CPA
Shepley, Henry Richardson......CPA
Sutton, Harold P. ......CGC
Snyder, Gerald S. ......AGC
Switzer, Byron R. ......AGC
Stewart, James Leonard......SLA: SAG
Spalding, Charles Thomas......SLA: SAG
Sanders, Ralph Lloyd......SLA; PMT
Sanderford, Horner F. ......SMM
Sivley, Andrew H. ......SMM
Simms, John A. ......PWM
Shephard, Herbert R. ......AGC
Stoddard, David I. ......SLA; VBW
Seaman, Lewis F. ......MIA
Stockard, Lester N. ......SLA
Stephens, Albert E. ......AGC
Seward, Leon E......CGC
Shoffstall, Frank S., Jr......CGC
Silver, Bertram E. ......CGC
Singletary, Harry H. ......CGC
Smith, Edwin C. ......CGC
Stuetz, Albert R. ......CGC
Smith, Robert C. ......AGC
Simpson, Jesse Ward ......FLA
Schiussel, Jacob Smith ......CPA
Smith, Felix Tesseire ......CPA
Soreng, Edgar M. ......WFO
Strachan, Otto W. ......GLC
Spencer, Elmer E. ......KST
Smith, Frank B. ......EOT
Shaper, Henry Francis......SLA; SAG
Sheldon, Sherwood M......RSD
Small, Clement ......SLA; EOT
Shelhy, Francis Haywood......SLA; CFT
Simon, Ralph John......SLA; FOB
Stokes, William Hughes......SLA; PWM

T

Trimble, Perry D. ......LHV
Toepfer, John Ralph......SLA; KST
Taylor, Joseph Ingraham......SLA; DAP
Trippe, Graham ......SLA
Troy, William Wylie ......SLA
Tyrrel, Charles P. ......CGC
Taylor, Raymond Edward......SLA; CRI
Towner, Archibald R. ......CGC
Tracy, Linwood Webster......SLA; TMA
Tindall, Howard Wilson......SLA; ELA
Taylor, Bennett Ross......SLA; ELA
Talbot, Harry Milton......SLA; ELA
Thompson, David E. ......CGC
Thompson, Robert B. ......CGC
Tilden, Averill ......CPA
Towner, Walter L. ......TFT
Trask, Verne Alva ......SLA; PWM
Townsend, Frederic W., Jr......CPA
Thach, Robert G. ......CPA
Thomas, George J. ......CGC
Talbot, Harry M. ......CGC
Tiffany, Herbert ......AGC
Taylor, Loren E. ......AGC
Thomas, Harry Lee......SLA; PWM
Tonkin, Thomas C. ......CGC
Taney, Theodore ......SLA; KST
Towe, William Thompson......SLA: CWT
Taylor, John A......AGC
Thompson, John F......AGC
Thornton, Clarke Wayne......SLA; ABC
Towle, Howard H. ......MIA
Thurshy, Sydney, Jr. ......SLA; KST
Taylor, Elmer L. ......TFT
Taylor, George F. ......CGC

U

Utley, Fred Herbert......SLA; CWT
Umstead, Stanley Nilward......SLA; CWT
Underhill-Thompson, Ernest Alfred.SLA; PWM

V

Van Emden, Harry Benjamin......SLA; SBI
Van Wicklen, John Henry......FLA
Von Sprecken, Theo. Markwaller....SLA; PWM
Van Aelst, Adrian Cornelius......SLA; SBI
Van Eaton, Harry H......FLA
Vogel, Harry James ......CPA
Vollmar, Paul J......SLA; FOB
Van Surdam, Henderson E......AMV
Vinson, Clyde ......CGC

W

Wentz, Robert Carroll......SLA; PWM
Wuertenhacher, Harry Edward, Jr...SLA; SBI
Wright, Elisha Pierson Swift, Jr..SLA; PWM
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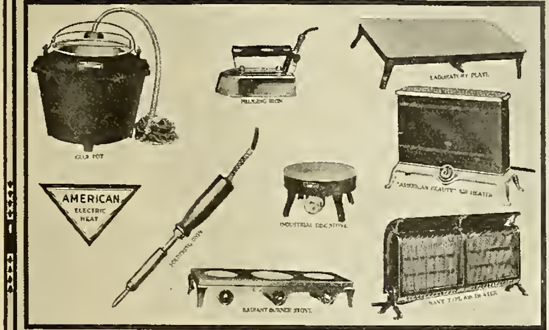

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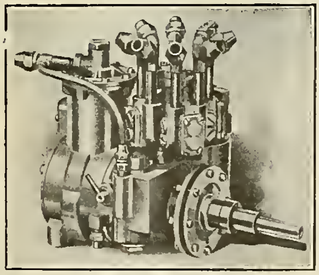

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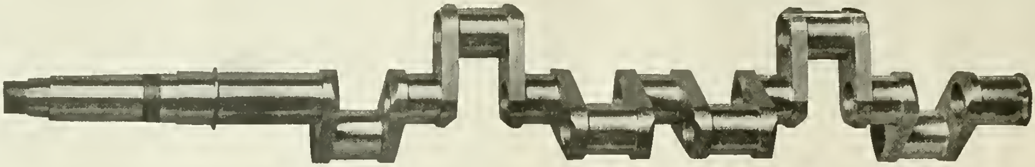

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Wallace, William, Jr.	EOT
Wentz, Robert C.	EOT
Warren, Harold Clyde	SLA; CRI
Walsh, Charles Vincent	SLA; CRI
Wotton, Thomas Andrew	CPA
Waddel, Chauncey L.	RSD
Wiepert, George Douglas	SLA; PMT
Willmering, Joseph F.	SLA; TFT
Waldo, Herbert Strong	SLA
Welsh, William Joseph	SLA
White, Leon Hosea	SLA
Work, James Ralph	SLA
Wentworth, Ralph Preston	SLA
Williams, George Wesley	SLA; ELA
Wakefield, Robert Brown	SLA; SAG
Wellman, Harrison W., Jr	PWM
Williams, John M.	FLA
Wells, George B., Jr.	FLA
Winslow, Burr Horton	SLA; CWT
Wiggs, George Absalom	SLA; CWT
Wheeler, Chilion Farrar	CPA
Wright, Wilbur F.	CPA
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Yapple, Lee Gerald	SLA; PWM
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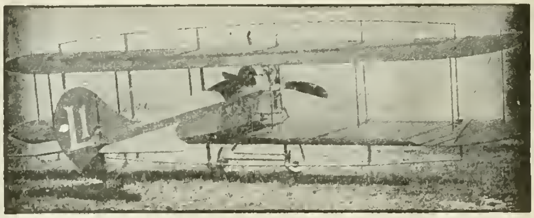

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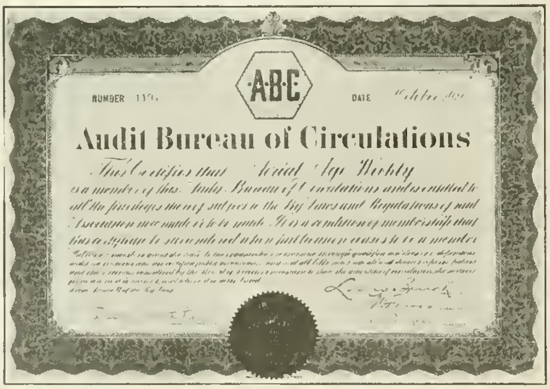

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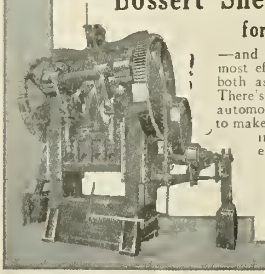

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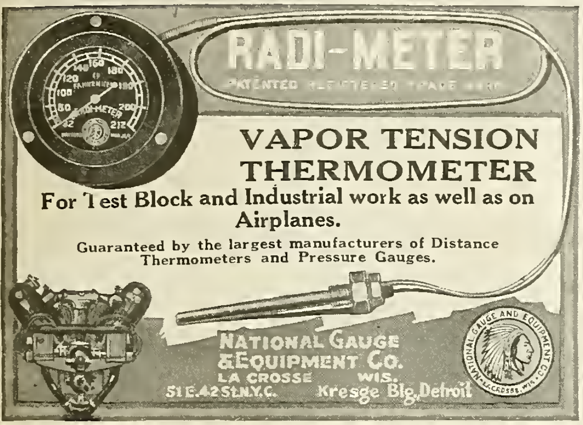

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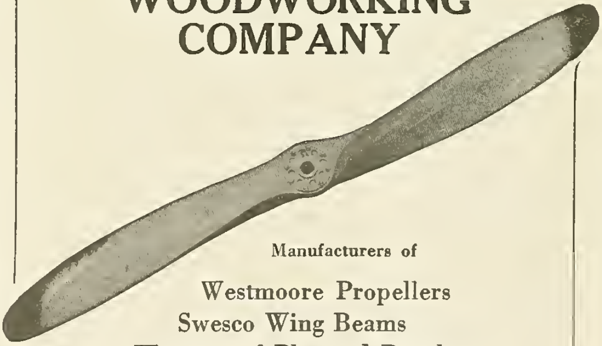

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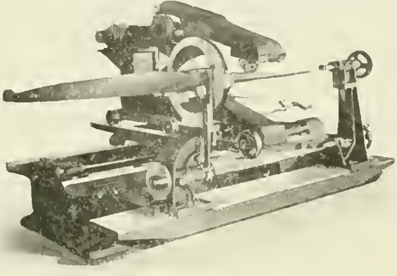

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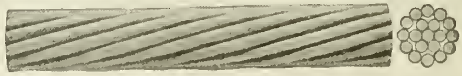

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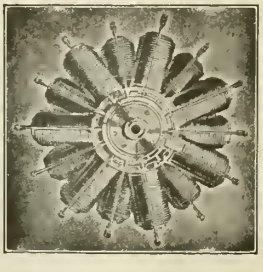

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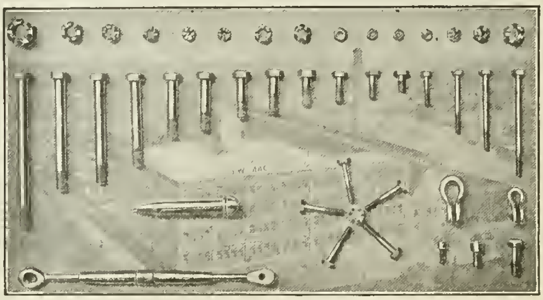

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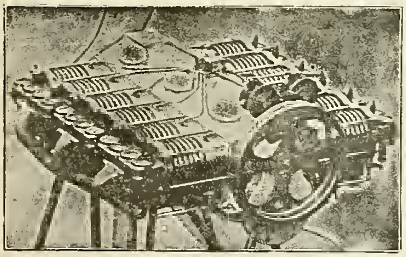

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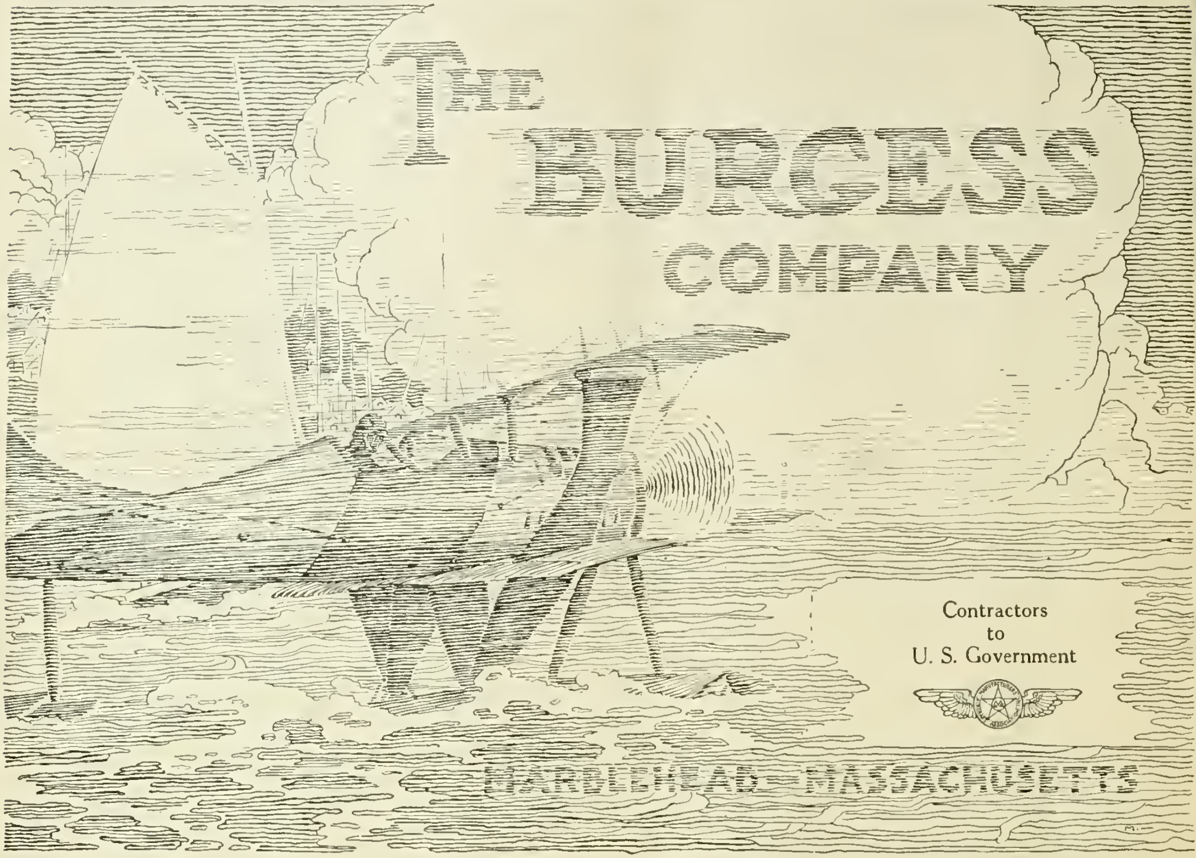

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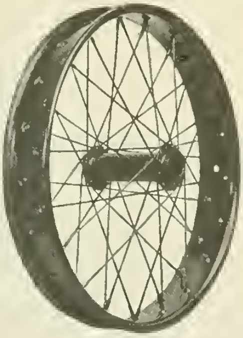
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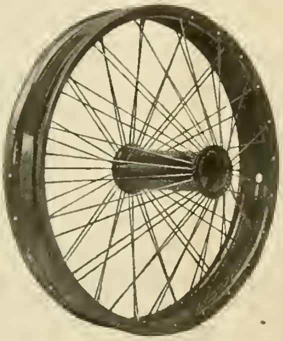
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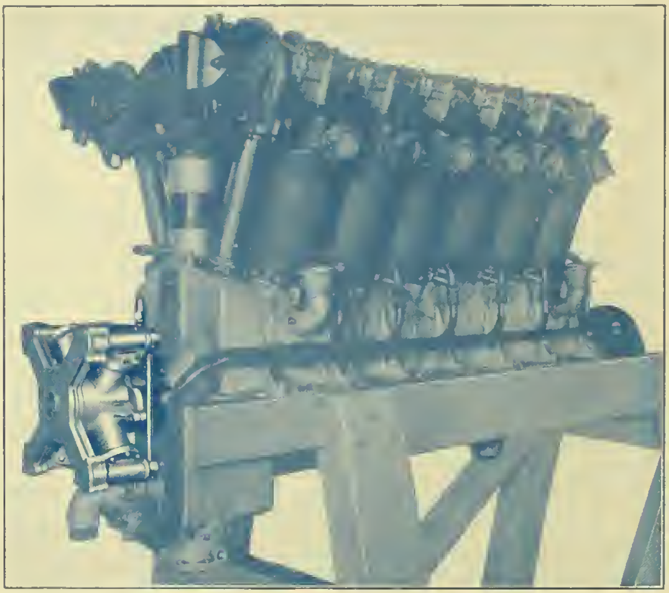

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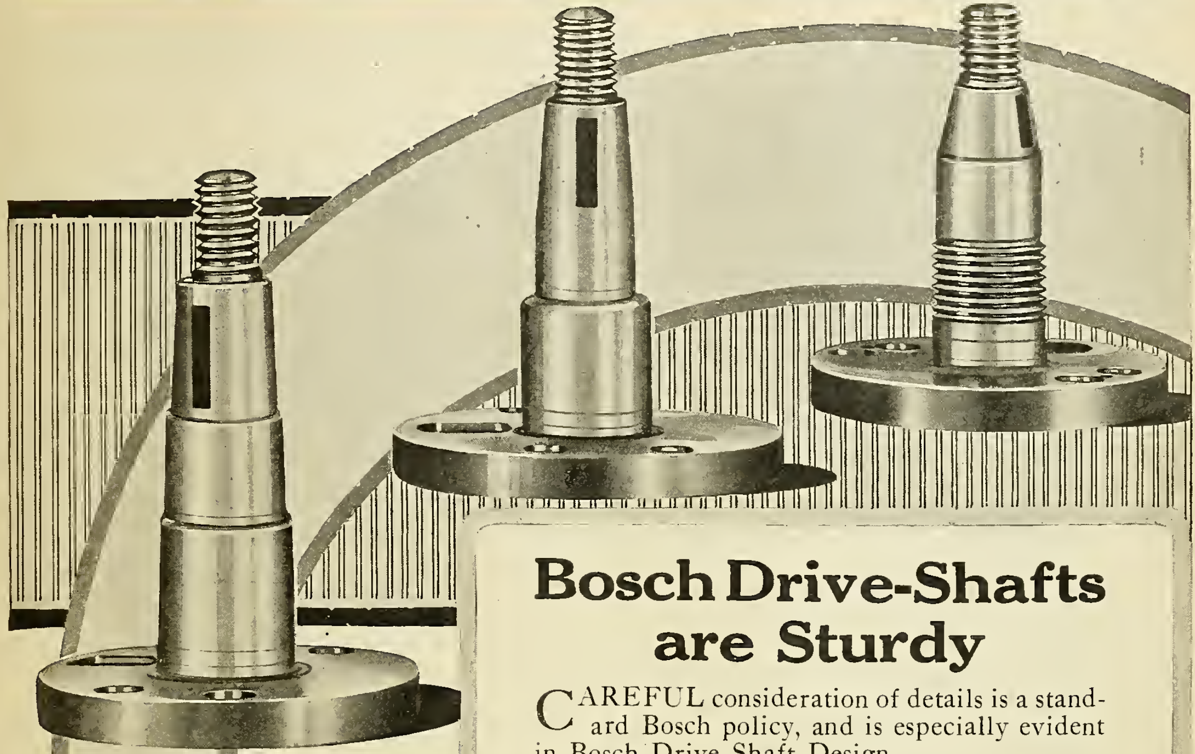

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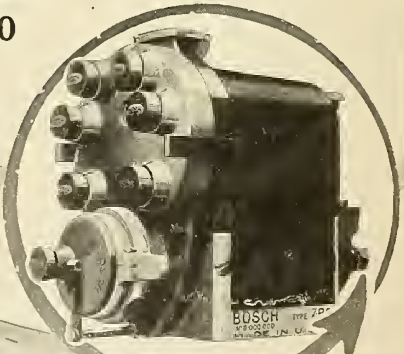

No. 1
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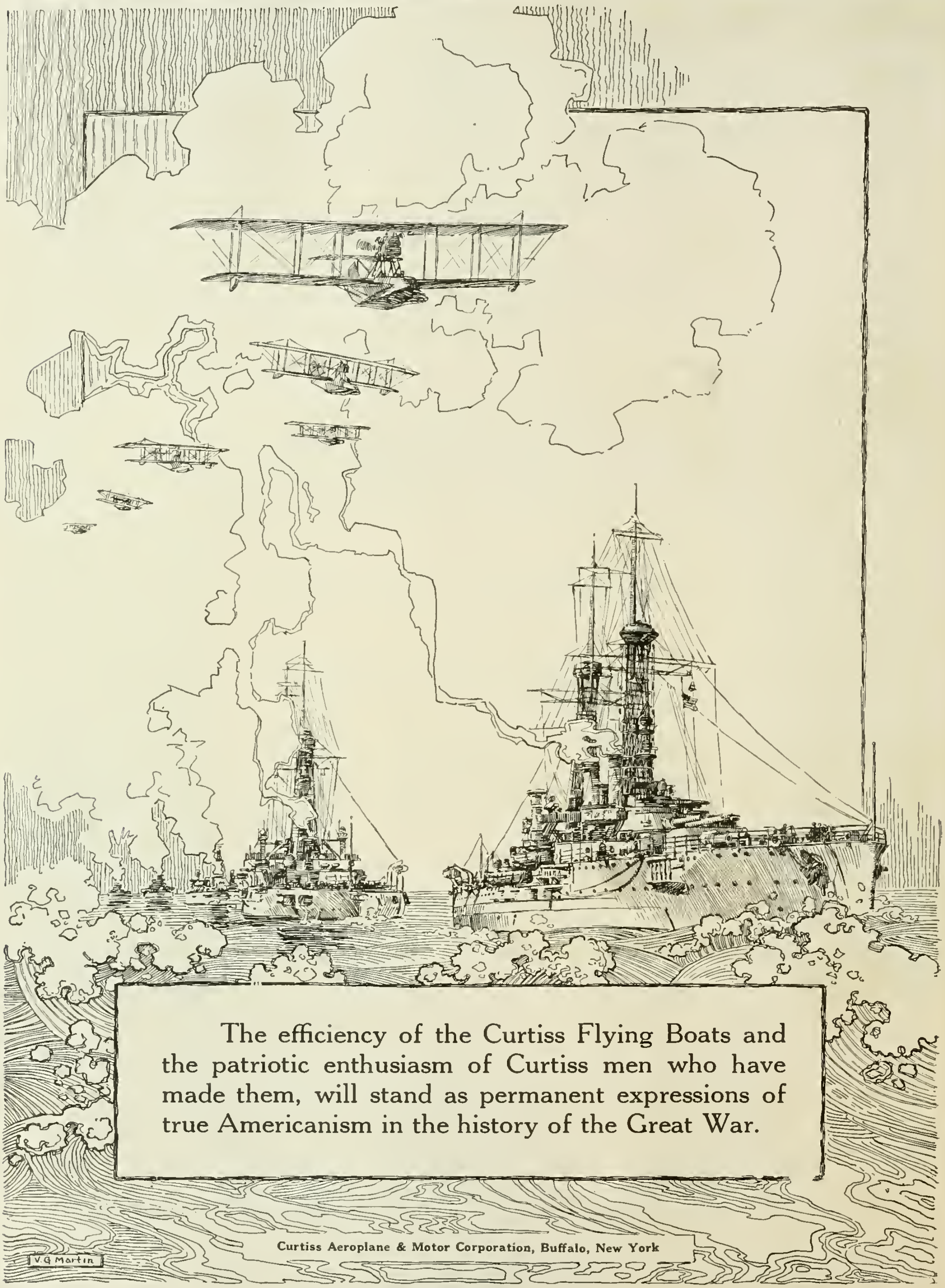

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AERIAL AGE
WEEKLY

VOL. VIII DECEMBER 23, 1918 No. 15

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VOL. VIII NEW YORK, DECEMBER 23, 1918 NO. 15

HOW TO EFFICIENTLY USE THE 20,000 LIBERTY MOTORS

By G. DOUGLAS WARDROP

WHILE I was in Detroit addressing the Society of Automotive Engineers, I received a large number of requests for information as to what the prospects are of using the twenty thousand Liberty Motors which will have been produced when production on present contracts is completed. I have since taken up the matter with the Government and aeronautic authorities and this investigation has lead to defining clearly the immediate prospects of the American aeronautic industry and American aeronautics in general. The result of this general inquiry, together with the prospects explained in Detroit, are being summarized herewith. The result of our inquiry shows that not only the twenty thousand Liberty Motors can be put into use during the coming eight months, but there will actually be a demand for as many more motors of different types.

This statement is based on facts. Knowing exactly what still remains to be done for national aerial preparedness, we know, for instance, that besides maintaining the Army, Navy, and Marine Corps, we still have to establish Naval and Military Air Stations in the United States and its territories, and that hundreds of aircraft are needed for our coast defenses, which have never had aircraft.

Aerial Age has published the reports of the Secretary of War, General Kenly, and the Navy Department, which tell exactly the aeronautic program needed for our national defense.

We have printed articles showing the extensiveness of the aerial mail plans to be put into effect during the coming year.

Over Two Millions for Aerial Mail Lines

Appropriation of $2,185,000 for purchase of aeroplane and maintenance of air-line service for the Post Office Department, which is an increase of $1,885,000 over the $300,000 originally estimated by the Department, is recommended in the Post Office appropriation bill reported to the House by Representative Moon, of Tennessee.

The bill carries recommendations for a total appropriation of $359,657,577. This is about $2,000,000 less than the appropriation for the present fiscal year, which was $361,477,577. The estimates of the Post Office Department for the next fiscal year amounted to $368,782,577.

There are a score of other important developments, each promising to require from a hundred to several thousand aeroplanes this year, such as the establishment of aviation sections in the police of the different cities. The fact that a single aerial policeman could have minimized the many losses of the Halifax fire, the recent Minnesota fire, and of numerous other such fires, floods, etc., as well as eliminating entirely the water pirates who prey on shipping wherever there is water commerce, will soon bring about legislation forcing each city to have an aviation section to its Police Department.

The Forestry Department, the Coast Guard, and other Government departments are also establishing aviation branches.

We know likewise of hundreds of sportsmen and others who are planning to purchase aeroplanes for use in the United States, Canada, South and Central America.

One of these plans to establish aerial passenger and express lines, headed by Captain Benjamin B. Lipsner, the energetic ex-superintendent of Aerial Mail Service, is announced elsewhere in this issue. Captain Lipsner and his public-spirited backers will use a number of large seaplanes and the manufacturing business from this one air line alone will, probably, be large enough to keep a factory going for several months.

Considering the above, which are only few of the high points of the prospects of the American aeronautic industry, we can truly state that the future is bright and that if the progressive manufacturers and leaders in the aeronautic movement join efforts by close co-operation, the aeronautic industry can be put on its feet and on a permanent self-supporting basis within the coming twelve months.

NEW YORK, CLEVELAND, CHICAGO AERO MAIL

THE first trip of the permanent Aerial Mail Line between New York-Cleveland-Chicago took place on December 18th.

The start was made soon after six o'clock from Belmont Park. Leon D. Smith piloted the first de Haviland Liberty plane which started just as day was dawning.

As Aerial Age goes to press Pilot Smith is on his way to Chicago.

Full account of the trip will be given next week.

Among the authorities present at the start were: Second assistant Postmaster-General Otto Praeger, from Washington; Postmaster Patten, of New York; L. T. Busler, chief of Maintenance and Eqnuipment; J. Clark Edgerton, chief of Flying Operations; Alan R. Hawley, president of the Aero Club of America; Henry Woodhouse, Captain Robert A. Bartlett, and Steffanson, famous explorers, Charles Jerome Edwards, G. Douglas Wardrop, managing editor of Aerial Age; Ralph T. Hale, Norman H. White, Norman H. White, Jr., Evan J. David, business manager of Flying; Leroy B. Gulotta, editor of Air Power; K. M. Turner, F. Gates Porter, M. Parker, the postmasters of Brooklyn and Belmont Park.

The progress made by aeronautics in the past three years has been enormous, and trans-Atlantic and trans-Pacific flights may be expected in the near future.

A few days ago an American aeroplane carried 50 passengers in a flight, and British, French, and Italian aeroplanes have carried up to 40 passengers in one flight. A dispatch from Italy reports that there is under construction an air liner which will carry 100 people for trans-Atlantic flights, and having beds and restaurant accommodations for the passengers.

Another aeroplane, carrying the famous British General Salmond, flew from Asia to Africa, a distance of close to 3,000 miles, and the Chilian aviator, Lieutenant Godoi, on December 11th, flew over the Andes, thereby completing the stupendous conquest of the mountains by aviators, who have now flown across practically every mountain range in the world, including the classic Great Atlas!

Verily this is the dawn of the Aerial Age, when those of us who have assisted the development of aeronautics for the past 15 years will see things happen such as we would never have dared to dream.

AERO CLUB OF AMERICA RENEWS EFFORTS TO GET PROPER AERIAL LAWS

THE creation of a substantial permanent committee to draft a series of laws covering national and international aerial navigation was authorized by the Board of Governors of the Aero Club of America.

This was done upon the recommendation of the temporary committee of the Club, which reported to the Board of Governors today, urging prompt action.

This subject has been studied and followed by a committee of the Club, consisting of the Hon. Murray Hulbert, Director of the Port of New York; Alan R. Hawley; W. W. Miller; Rear Admiral Robert E. Peary; Rear Admiral Bradley A. Fiske; Henry A. Wise Wood; Henry Woodhouse; Alberto Santos-Dumont; John Hays Hammond, Jr.; W. W. Young; Colonel E. Lester Jones; Emerson McMillin; Charles Jerome Edwards; Augustus Post.

Members of this committee have followed every phase of development of aerial laws in Europe, and have had opportunity to study the effectiveness of the British Aerial Navigation Acts of 1911 and 1913, as well as the French, Italian and German aerial laws.

They have also studied the problems of national aerial navigation and have come to definite conclusions as to the necessity of having federal registration of aircraft, which they believe should be similar to the federal registration of ships.

The committee points out that all aerial navigation acts of European nations were intended to restrict the circulation and use of aircraft. They were essentially military measures, restricting aerial navigation to certain zones within nations.

What must be done now is to shape laws to govern international aerial navigation based on broad fundamental principles which will meet the conditions arising from the general use of large aircraft for the transportation of mail, express and passengers, as well as international air travel. It is pointed out that unless attention is given to this subject now, there is danger that half measures or restrictive laws may be adopted, and there is even danger of states adopting state registration laws, which would be absurd, since aircraft travel so fast that their employment for flying across the continent will soon be common. Therefore federal registration is recommended.

The Committee on Aerial Laws is to be appointed by Mr. Alan R. Hawley, the President of the Aero Club of America, within a few days.

CONGRESS INCENSED OVER DELAY IN TURNING MILITARY PLANES OVER TO AERIAL MAIL SERVICE

CONGRESS'S great interest in the aerial mail service was demonstrated on December 17—the fifteenth anniversary of the first flight—when the subject came up for discussion in the House of Representatives.

The remarkable record made by the Post Office in the past six months in running the Aerial Mail Service daily on schedule time, rain or shine, has created country wide demand for the extension of the service and the Post Office had arranged for this extension to take place immediately upon the signing of the armistice when the stopping of shipments of planes overseas would give the needed planes and motors for the mail service.

Under the provision made by Congress last year in the military appropriation bill the War Department is to turn over to the Post Office for the Aerial Mail Service planes and motors which cannot be used for military purposes. Acting under this act Secretary Baker, two weeks ago, ordered one hundred DeHavilands and twelve Handley-Pages turned over to the Post Office and some of these machines were to be used immediately for the extension of the Aerial Mail Service. But one delay followed another and, finally as the planes were not delivered by December 17, Congressman Moon, the chairman of the House Committee on Post Office and Post Roads, to get prompt action introduced a resolution ordering the War Department to deliver the planes and motors now, to save the large cost of storing them away.

Congressman Moon stated in Congress that the War Department had discretion as to turning over its aeroplanes to the Post Office. and that they had refused to let go of them. This statement aroused the wrath of several members, among them Representative Robbins, republican, of Pennsylvania, who said it was time Congress put a stop to allowing departments to run Congress.

"It seems to me that the Departments are ignoring the laws that Congress passes," said Mr. Robbins. "We sit here like a lot of dupes and supinely let these various departments run over us. It is time we asserted ourselves. We should make it mandatory upon the War Department to turn over these aeroplanes for this service instead of appropriating over $2,000,000 for the Postmaster General to buy aeroplanes that are already available and of no use to the War Department. The war is over now, and unless these machines are used for carrying the mails they will rust out and disintegrate."

The same view of the situation was taken by Representative Sumners, democrat, of Texas. He insisted that it was time to use "horse sense" and that it was ridiculous to buy more aeroplanes and let those now available in the War Department be put to useless employment.

"If the Secretary of War will not turn these machines over," said Mr. Sumners, "he should be compelled to do so. We ought to stop spending money uselessly.

Resolution to Force Delivery

Representative Madden defended the proposal to have the Post Office Department buy aeroplanes that the transcontinental mail service may be established promptly. He did not oppose the amendment offered by Mr. Moon, however, to have the army aeroplanes turned over to the Post Office Department, but insisted that the department should have them by whatever means it was necessary to employ to get them.

After the point of order against the Moon amendment had been sustained by the chair it was offered in an amended form by Representative Garrett, democrat, of Tennessee, and provided as follows:—

> That the Secretary of War is hereby directed to deliver immediately to the Postmaster General 100 de Haviland fours, 100 Handley-Page planes, 10 Glenn Martin day bombers, all planes completely assembled, with spare parts. Also 100 Liberty motors, with spare parts, 50 Hispano-Suiza 300-horsepower motors and 25 Hispano-Suiza 150-horse power motors. The same is to be out of any equipment that the War Department has on hand or under construction, the War Department to be credited with the equipment turned over.

The Garrett amendment cut the appropriation from $2,185,000 to $500,000 and provided that none of this sum is to be used for purchase of new machines, but merely for maintenance and operation. It is expected that this amendment finally will be agreed to when the bill comes up for final action. The discussion to-day was in committee of the whole and must be approved later when the bill is finally voted on.

CAPTAIN LIPSNER PLANS EXTENSIVE AERIAL TRANSPORTATION LINES

THE energetic Capt. Benjamin B. Lipsner, who recently resigned as superintendent of the aerial mail service, announced on December 17 that a syndicate had been formed to back him in establishing an aerial passenger and express service. The enterprise will have a capital of $1,000,000.

He also declared that unless some one should do so before him he will make the first trans-atlantic flight June 15, following the route taken by the steamship George Washington, which carried President Wilson to France. A seagoing plane to make the flight, he continued, now is in course of construction and it will be built so it will be able to fly, rain or shine. As to the service in this country he added:

(*Continued on page* 761)

THE NEWS OF THE WEEK

600 Naval Airmen Return

Norfolk, Va.—More than 600 officers and men of the naval aviation forces who have been serving overseas arrived at the Hampton Roads naval base December 15 on the transport Susquehanna, which was sixteen days crossing the storm-swept Atlantic. In spite of rain and mist, the men were welcomed by a big crowd.

Among the arrivals was Franklin K. Lane, Jr., son of the Secretary of the Interior, who was greeted by his father, mother and sister.

Major Hitchcock Among Those Honorably Discharged

Major Thomas Hitchcock, sportsman and polo player, has been honorably discharged from the air service at his own request. He is now in Aiken, S. C., with his family.

His son, Thomas Hitchcock, Jr., of the Lafayette Escadrille, who became an ace before being shot down, is with his father, recovering from his wounds.

The Navy Fliers

In his annual report Secretary of the Navy Josephus Daniels pays high tribute to the Aviation Branch of the Navy. The expansion of Naval Aviation, it is stated, has been of gratifying proportion and effectiveness. Statistics show the total enlisted and commissioned personnel on July 1st, 1918, numbered approximately 30,000. Of this number, 823 were trained naval aviators. There were 2,052 student officers, 400 ground officers, 7,300 trained mechanics, and 5,400 mechanics in training.

Declaring that Naval Aircraft had been a big factor in the war, Secretary Daniels in his report declares that plans are being made for its permanency and development. The Secretary paid tribute to the Ordnance Bureau of the Davis Nonrecoil Aircraft Gun, which is declared to be "A Great Milestone in Aircraft Armament."

Airships Can Cruise Now for 4,000 Miles

London.—For the immediate future, according to further extracts from the reports just completed by the Civil Aerial Transport Committee of the Air Board, the commercial airshap offers a great advantage over the aeroplane, particularly concerning passengers where comfort and ease of navigation and a high ratio of disposable lift are vital considerations.

Airships now exist, the report says, with a range of more than 4,000 miles, and they can travel at a speed of seventy-eight miles an hour. By running their engines slower a maximum range of 8,000 miles can be obtained.

On first speed, Cape Town, South Africa, is today aerially only a little more than three days from Southampton, while this ship could fly across the Atlantic and return without stopping.

The committee points out that the future airship will soon develop a speed of 100 miles an hour, that it will be fitted with ample saloons, staterooms, with an elevator to a roof garden, and will be able to remain in the air for over a week.

Limits Stunts in Aeros

Because many aviators in this country had taken to acrobatics since the armistice was signed, resulting in an increased accident list, the War Department recently ordered there should be no fancy flying lower than 1,500 feet. The acrobatics, it was stated, had been performed largely in connection with celebrations near cities, towns and buildings. Strict discipline will be enforced against any violating the new order.

New Insignia for Instructors

Washington.—Army aviation instructors have been authorized by the War Department to wear on the left arm a sleeve decoration consisting of gilt wings the same size as those in the insignia on the collar decoration.

This award, it was announced, "is made in appreciation of the services of the several hundred fine fliers who have been kept at home for use on the flying fields of this country in turning out the quota of pilots asked for by the Allies.'

Aviators Can Talk 25 Miles by Radio Phones

Camp Meade.—Aviators can now talk twenty-five miles through the air to radio telephone men on the ground.

Announcement of the rapid improvement of the wireless telephone, which permits such use of the radio outfit, has been made by signal corps officials here.

"Even in the worst of weather we have no difficulty in talking six miles over the wireless telephone," said private William Kunst, one of the wireless experts at the camp. "In clear weather, when atmospheric conditions are excellent, we can talk twenty-five miles over the phones," he declared.

Flies Over Highest Andes

Buenos Ayres.—Lieut. Dagoberto Godoy of the Chilean army crossed the Andes Mountains at their highest point in a Bristol aeroplane, donated by the British Government. The aviator left Santiago, Chile, and crossed the Tupungato range at an altitude of 19,700 feet, landing at Mendoza, Argentina.

Lieut. Godoy is the first Chilean and the second man recorded as crossing the Andes by aeroplane. The first flight across the mountains was made last April by Lieut. Cendelaria of the Argentine army, who crossed at an altitude of nearly 11,000 feet.

Fly from Egypt to India to Confer About Air Route

London.—Major Gen. Salmond, commanding the Royal Air Forces in the Middle East, accompanied by Captain Ross Smith, has arrived at Karachi, on the Baluchistan border, and is in conference with the Government of India regarding the establishment of an aerial service to India.

These aviators have just completed a flight from Cairo to Karachi, 2,548 miles, in thirty-six hours actual flying time. Their route was by way of Damascus, Bagdad, Bushire, Bandar Abbas, Sarbaz and Karachi.

The machine used for the purpose had previously been flown from England to Egypt and took active part in final operations against the Turks in Palestine.

General Salmond will continue his journey by air to Delhi.

British Arranging Tours by Air Routes

London.—The first aerial commercial service in Great Britain is already in the last stages of development, with the initial route connecting London and Harrogate and the speed to be 120 miles an hour.

Holt Thomas, managing director of the British Aircraft Manufacturing Company, said:

"It will be a summer service at first, and we will use the single engined war aeroplanes, with comfortable covered cabins holding four passengers. We are also opening air routes all over the world in conjunction with local companies. In France we will operate in connection with a French company, and already arrangements for such a service are practically completed in Norway, Denmark, Italy, India and Africa. Later we will extend the service to Japan, China and the West Indies."

Arrangements already have been made by the British Air Service to keep Paris in close touch with London during the peace conference. Any important data required at the conference will be forwarded from London to Paris by aeroplanes.

Promotions and Commissions

Washington.—The decision made by Secretary of War Baker, withholding all recommended promotions and commissions in the Reserve Corps and United States Army, has excited very unfavorable comment. It would seem that all recommendations for promotions and commissions that were on file in the War Department as a result of hard labor and faithful work should be acted upon favorably, and the desired honor granted to all recommended if filed with the adjutant general prior to the date of the armistice. Not since the war started has there been such bitter disappointment expressed on any subject of like nature as on this matter. As many of the prospective recipients of the advanced honors are about to be disconnected with the service—the cost to the government would be but a mere trifle and in many cases the promotion and discharge would be simultaneous—or could be made so.

The famous veteran aviator Carl Batts, who was the first to loop 136 times consecutively, his father, John T. Batts and brother Lieut. W. H. Batts

Report of Trans-Continental Map-Making Tour

In a wire report dated Tucson, Arizona, December 6th, to the Division of Military Aeronautics, Major Albert D. Smith, commanding the squadron of five planes on the way East from Rockwell Field, San Diego, California, said that the work of map-making and location of landing fields for the Southern trans-continental air route was proceeding satisfactorily. One plane was lost in a fog over the Arizona desert on the first day out, and in the forced landing that resulted this plane suffered such damages that it had to put back to Rockwell Field. Part of Major Smiths report follows:

"In compliance with instructions, five Curtiss JN. 4-H planes departed from North Island at 2:30 P. M. on December 4th. One plane became separated from the squadron on account of a heavy desert fog lying low along the east side of the mountain range. This plane was forced to land at Ellentro, damages resulting, and the following morning it returned to San Diego. The four other planes landed at Calexico, Camp Beacon. This field is considered too small for practical uses, but the Calexico Chamber of Commerce will gladly enlarge the field if requested. The four planes proceeded on their way, starting from Calexico at 12:00 noon December 5th. Navigated by compass, the squadron crossed the desert. No possible landing fields were seen on this course.

"The squadron picked up the Southern Pacific railroad tracks at Yuma. No landing field is available at this place at the present time, although one can be arranged. Following the Southern Pacific to Gilabend, few available landing fields were noted on this course. At Gilabend the squadron left the route of the Southern Pacific and took a Northeastern course by compass direct to Phœnix. Landing fields are available along the Gila River for nearly the entire distance between Gilabend and Phœnix. All the planes landed at Phœnix safely on the fair grounds, which was small even for a squadron of this size. However, at my request the field on the ground was enlarged to proper size. The city of Phœnix is very anxious to assist in every possible way, even to the extent of erecting a hangar, if needed. The city of Phœnix has asked that the landing field here be named 'Luke Field.'

"Upon examining planes here it was found necessary to change one propeller, which we were able to do, having carried two extras along with us. Minor adjustments were also made on other planes.

"On the sixth the weather was cloudy the entire day, with light showers.

"Leaving at 2:45 P. M. December 7th, the squadron, resuming its flight towards El Paso, took a southeastern course by compass, locating suitable landing fields under us for practically the entire distance to the Southern Pacific railroad tracks at Casasgrand. From this point the squadron followed the Southern Pacific tracks to Tucson, locating landing fields in the valley adjacent to the railroad for the entire distance.

"Tucson has a perfect landing field available. Two hundred acres are leveled and rolled for our use and the city is willing to erect a hangar. This field is 2½ miles from the city.

"We will probably land at Deming, New Mexico, for supplies, having encountered a twenty-five mile wind from the east since leaving Calexico."

The Wireless Telephone

The development of voice control of aeroplanes in flight recently demonstrated publicly for the first time by Colonel C. C. Culver before President Wilson and others provides an interesting story. The idea of giving command by voice to a fleet in the air was first conceived by Colonel Rees and Colonel Culver in October, 1910, while on duty at the International Aviation Tournament at Belmont Park. In August of the same year Colonel Culver and H. M. Horton, (now Captain in the Air Service) established communication by radio telegraph from an aeroplane in flight to the ground at an aeronautical meet at Sheepshead Bay, New York. Captain Horton built the transmitting set and Colonel Culver the receiving set.

Five years later Colonel Culver was sent to the Aviation School, San Diego, California, for the purpose of studying the practicability, and for the purpose of working on the general program, of radio for aeroplanes. For more than a year he worked on various devices. Telegraph apparatus was designed and built which enabled the establishment of communication from aeroplane to ground, from distances up to 140 miles. On September 2, 1916, a message was transmitted from one aeroplane to another in flight for the first time. It was about this time that the development of radio telegraph set for aeroplanes was undertaken.

Colonel Culver continued his experimenting and in February, 1917, a trial of the radio telephone set resulted in the transmission of the human voice from aeroplane to ground. On May 22nd of the same year General George O. Squier, Chief Signal Officer, called into conference Colonel Reese of the Flying Corps, Dr. F. B. Jewett of the Western Electric Company and Colonel C. C. Culver, U. S. A., for the purpose of discussing Air Radio Telephone Communication. In order to bring the problems in connection with the development of voice control in concrete form to the attention of the radio telephone engineers in the country, a memorandum was given to Dr. Jewett covering the general requirements of an air Radio Telephone Set. General Squier then organized a Radio Development Section of the Signal Corps, in charge of Lieut.-Colonel Slaughter. A private exhibition of the demonstration of telephonic communication from an aeroplane in flight was given on August 22nd, before Secretary of War Baker and Chief of Staff General Hugh L. Scott at Langley Field, Va. In the Fall of the same year Colonel Culver was sent abroad, taking with him sets of various types of apparatus, in order to demonstrate to the officers of the United States and Allied forces the practicability of the idea. On the return of Colonel Culver to the United States in the present year, under the immediate supervision and with the whole-hearted support of Major-General Wm. L. Kenly, Director of Military Aeronautics, there has been continuous progress made in the working out of tactical porblems through the use of the wireless telephone and the development of its application to various air service activities.

The A B C of Aviation

The A B C of Aviation, compiled by Captain Victor W. Page of the Signal Reserve Corps, A S., is a most complete and practical treatise outlining clearly the elements of Aeronautical Engineering with special reference to simplified explanations of the theory of flight, aerodynamics, and basic principles underlying the action of balloons and aeroplanes of all types.

A non-technical manual for all students of aircraft, including instructions for lining up and inspecting typical aeroplanes before flight and also gives easily understood rules for flying.

This sells at $2.70 postpaid, and is obtainable at The Aeronautic Library, Inc., at 299 Madison Avenue, New York City.

Aeroplane Characteristics

Aeroplane Characteristics, compiled by Frederick Bedell, is a systematic introduction for flyer and student and for all interested in aviation. It explains in a most comprehensive manner the principles of aeroplane sustentation and stability, the characteristics of an aeroplane in flight, air resistance and power characteristics. There are several diagrams included in this volume. This book sells at $1.75 postpaid, and is obtainable at The Aeronautic Library, Inc., 299 Madison Avenue, New York City.

Aeroplane Construction and Assembly

Aeroplane Construction and Assembly, compiled by J. T. King & N. W. Leslie, is a most instructive manual on aeroplane construction and rigging.

It gives the mechanic a practical understanding of the work he will be expected to carry out.

It is an elementary and comprehensive volume for the beginner, taking in flying, materials used, structural features, assembling and alignment of same.

It also contains a very valuable nomenclature of aeronautical terms, and a line drawing of an aeroplane descriptive of all its parts and how to locate them easily.

This book sells at $1.65 postpaid, and is obtainable at The Aeronautic Library, Inc., 299 Madison Avenue, New York City.

Third of the People Will Travel in Air in Ten Years

"Dirigibles for scouting and observation," answered Leo Stevens, foremost of balloonists, chief instructor and expert now at Fort Omaha, when asked what next would develop in army ballooning. "Dirigibles will make 100 miles an hour and aeroplanes travel 250 miles an hour in two years," Mr. Stevens continued. "I predicted in 1906 that dirigibles would cross the Atlantic in a few years and they will."

"You don't care where your free balloon drifts?" he was asked, relating to his trip this week to Topeka.

"Oh, yes, I do care," he spoke up quickly. "I'm one of the few men who thinks he can go about where he pleases if he finds the air current he is in or a current above or below is going in his direction. There are as many air currents as there are points of the compass; some do not have a drive behind them."

Since he raced with Santos Dumont, Stevens has been a "hopeless enthusiast" in ballooning. He prefers its "smooth motion" to that of the aeroplane. "You cannot observe much from the plane," he says. "It is like some one throwing gold out all the way. I can see more from an aeroplane with my naked eye than with the glasses. But the aeroplane is the defender of the kite balloon and they work together."

It was nine years ago that Mr. Stevens did his first work for the Government through his offer to General Allen. The army had no balloons; he happened to have ten of different sizes, two of them dirigibles.

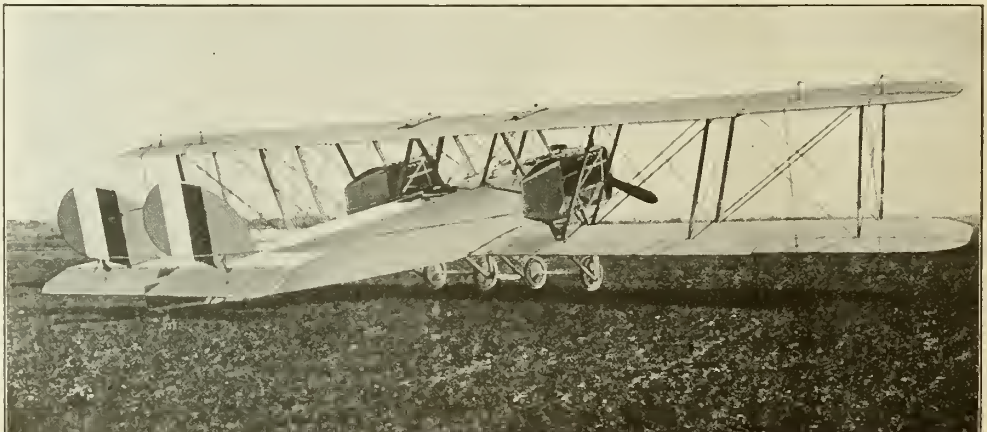
Mr. Stevens praises the business men who got into ballooning. The first twenty of these, who went into the army, including Captain C. J. Glidden, he taught.

"Within ten years many wealthy people," forecasts Mr. Stevens, "will be living in the air part of the time and owning balloons, power balloons and aeroplanes and taking 1,000 and 1,500-mile trips with no trouble at all. Thirty per cent of the people will travel through the air ten years from now," and Mr. Stevens digressed to tell how beautiful it is never higher than four miles up with the sunshine there all the time.

"The sausage balloon or kite balloon has played a most important part in the past war," Mr. Stevens declares, "directing the firing of the cannon. The pilot balloonists made at Omaha were the only ones ready to get into the war."

Some of them were 40 to 60 years old; one might think past the age of adventure and getting the idea of ballooning. But they did it.

"What shall I do next? I don't know what the Government wants of me. Chances are I shall go back to private life. I have taught personally 600 men as much as I know; there are 6,500 trained men in the ground aviation work of the balloon corps."



The Glenn L. Martin twin Liberty engined bomber that flew from Pittsburgh to Washington, a distance of 175 miles in one hour and fifteen minutes

The AIRCRAFT TRADE REVIEW

New Standard Aircraft Club Opened

On Monday, December 9th, the new clubhouse of the Standard Aircraft Club was formally opened with a dinner, followed by a dance.

The club is a reconstruction of the big hangar that was built to house the Langley, the first Handley Page machine to be built by the Standard Aircraft Corporation.

In it are bowling alleys, swimming pool, billiard rooms, writing rooms and all the conveniences of a real club.

Change of Dates of Automotive Engineers Annual Meeting

The time of the Winter Meeting of the Society of Automotive Engineers, which was to be held January 12-14, has been changed to February 4-6. These latter dates have been set as a matter of convenience to the S. A. E. members who desire to attend also the New York Automobile Show to be held during the first two weeks of February at Madison Square Garden. The S. A. E. members are engaged in automotive engineering at all the automobile, truck, tractor, aeroplane, and motorboat points in this country, as well as many such manufacturing centers abroad.

This Carry Through Meeting of the S. A. E. to be held in February will be the occasion of illuminating technical sessions on the different automotives, and on fuel for internal-combustion engines. A whole half-day session will be devoted to consideration of gasoline, kerosene, benzol and other fuels. Representatives of the Government will present their latest data as to supplies and the results of recent intensive research of a startling nature. Men of acknowledged authority will discuss this matter from the standpoint of engine design. Many other timely subjects will be discussed. Members returned from the front will relate their experiences, and particulars never before made public concerning war automotive apparatus will be given in papers by members and others in Government service.

The S. A. E. Victory Dinner will be held on February 6 at the Hotel Astor. It is expected that in attendance and interest this will break all records of the Society.

New Balloon Gas for Army and Navy

Washington—Discovery of an inert, non-inflammable gas for balloons, dirigibles and other lighter-than-air craft was revealed by the Navy Department December 9 in a statement explaining expenditures for its production now being made jointly with the army.

The department said the use of this new element, officially termed "argon," will eliminate the hazard of fire and explosion that always has accompanied balloon operations where hydrogen has been used to inflate the gas bags.

The gas from which "argon" is obtained comes from the wells at Petrolia, Tex., owned by the Lone Star Gas Company, the statement said, and a ten-inch pipe line to cost $1,050,000 is being laid for a distance of ninety-four miles from the wells to a plant at North Fort Worth, where the gas will be compressed into cylinders for shipment to the balloon fields.

High-proof gasoline is obtained in a ratio of about five gallons per 1,000 cubic feet of gas, it was said, and after the 1 per cent. of "argon" is removed by agreement with the Lone Star Company, the remainder of the gas is turned into the city mains of Fort Worth and Dallas.

The department estimates that the plant at North Fort Worth, designed by the Navy Bureau of Yards and Docks, and which will cost $900,000, will be completed by next April 1.

War Risk Insurance Information

A compensation application blank for a person disabled in the service (Form 526, Treasury Dept., BWRI) should be furnished to every disabled officer and enlisted man and every officer and enlisted man claiming disability at the time of his separation from the service. Assistance should be rendered in filling out the application, and complete information as to the proof required in support of his claim should be supplied to the claimant. Care should be taken in answering Question 5 on page 2 of application blank that a statement is made as to whether the claimant was accepted for general military service or for special or limited service only. [See also last sentence of Par. 9, Cir. No. 73, W.D., 1918.]

The compensation application blank, when properly filled out and executed by the officer or enlisted man, will be forwarded immediately by the camp personnel adjutant to the Compensation Section of the Bureau of War Risk Insurance with the copy of the report of the physical examination of the officer (Form No. 395-1, A.G.O.) or of the enlisted man (Form No. 135-3, A.G.O.) attached thereto. If the officer or enlisted man does not desire to execute an application for compensation the notation "Officer (soldier) did not desire to execute Form 526, BWRI," will be written or stamped on the copy of Form No. 395-1, A.G.O., or Form 135-3, A.G.O., as the case may be. The copy of the report of the physical examination of the officer or enlisted man will then be forwarded by the personnel adjutant without letter of transmittal directly to the Compensation Section of the Bureau of War Risk Insurance. (See last sentence of Par. 2, Cir. No. 23, W.D., 1918.)

The proof called for in paragraphs 3, 6, and 7 of the instructions on page 1 of the application blank should be incorporated in the blank affidavit on the last page of the application blank whenever possible. If the affidavits of two persons to the required facts cannot be secured when the application is executed by the officer or enlisted man, he should be advised that they must be obtained on his return home and forwarded to the Compensation Section of the Bureau of War Risk Insurance, with a statement giving his full name, Army serial number, if an enlisted man, grade and organization in the service and date of discharge or separation therefrom.

The claimant should be advised that so much of the proof called for in paragraphs 3, 4, 5, 6, and 7 of the instructions on page 1 of the application blank as is not incorporated in affidavits ou the last page of the application at the time the application is executed, must be secured by him on his return home and forwarded immediately to the Compensation Section of the Bureau of War Risk Insurance in support of his claim.

The advice and assistance of the camp war risk judge advocate should be fully utilized in the preparation of applications for compensation.

By order of the Secretary of War:

PEYTON C. MARCH,
General, Chief of Staff.

WATERPROOF WATCH

THE war has been instrumental in bringing about the creation of an absolutely "water and dust proof watch."

The many hundreds and thousands of wrist watches which went "bad" while in use by the men of the Overseas Forces caused an investigation to determine the reason for the short life of the wrist watch.

After countless movements had been examined and tested, Mr. Depollier's men reported that in the majority of instances the watches had become useless because of the inadequate protection afforded by the watch casing. Water, dust and poison gas had all percolated into the interior of the watch, rendering the delicate works useless and generally a total loss. Movements themselves, when manufactured by a reputable maker, appeared to be without fault and therefore the designing and creating of a casing "which could not fail,' even under the stress of such strenuous service as it would be put through by the Overseas Forces, was finally undertaken by Mr. Depollier.

The patent records of Europe and the United States show that for over fifty years many attempts have been made to produce a waterproof watch, watches which all ended in being merely moistureproof, and at that, resulting in failure, for the water and moisture inevitably percolated through the case by capillary attraction.

Mr. Depollier states that it took him more than twelve months to discover the reasons why previous makers had not produced a real waterproof watch which would stand the wear and tear of practical and constant usage.

While many attempts had been made to produce such a casing, none was able to withstand varying climatic conditions, and neither did the complicated design of the case permit easy access to the regulator or the watch hands. It seemed to be the limit of the manufacturers' ability to produce watches only temporary moistureproof for exhibition purposes.

Constant demands from Aviators, Marines, the Army and Navy, and men engaged in out-of-doors pursuits necessitated the creation of this new water and dustproof watch. Mr. Depollier immediately recognized this necessity and was sufficiently encouraged to experiment toward the production of such a watchcase, a case without wearing parts, with no rubber, cement, paraffine or other waterproofing material which would dry, crumble or devitalize with time. Obviously such a case must also be so designed as to be "foolproof" as well as water and dustproof, for the watch would have to be wound once every twenty-four hours and yet prove impervious to water, dust, alkaline, gas or other injurious foreign substances.

In the booklet describing the Depollier water and dustproof watch the construction is described as follows:

"The Depollier Field and Marine Watch has, as a packing for the back and bezel, a washer which is soaked with a water-repelling saturant, and the back and bezel are screwed down. Portions of the back and bezel press against the washer and squeeze the saturant out into a reservoir, which receives the overflow, keeps the washer saturated, and prevents it from getting dry, or becoming devitalized, or glazed. In other words, the washer is like a lamp wick. It has a reservoir to draw the saturant from, thus permitting the washer to retain its resilience. This produces a watch case which will retain its waterproof quality indefinitely.

"The adoption of an unbreakable, non-inflammable glass necessitated in itself a separate invention, the 'double-clinched bezel,' for it had been found that sudden climatic changes from a warm room to the freezing air of the winter months contracted the cellulose material used as a glass to such an extent that it became loose and more frequently came entirely out of the bezel of ordinary design, leaving the watch-dial unprotected.

The double-clinched bezel overcame this harmful effect, and while it not only grips the glass above and below around the entire circumference, it renders the contact between glass and bezel the only practical water and dustproof bezel.

The effect of these remarkable improvements in the designing of a watch case has had a marked tendency to disprove the unconsciously adopted feeling that "all the qualities of a good watch are in the movement." The War proved that regardless of the high type of movement, it must be adequately protected by its casing.

The Depollier waterproof watch, known as the Depollier "Field and Marine" Watch, is subjected to rigid tests before the movements are fitted, and again after this operation they are given a further individual pressure test under water before leaving the inspectors.

To the out-of-doors active man, sportsman, traveler, seafaring man, or man engaged in a pursuit where he is in an atmosphere of dust or grit or dampness, the Depollier water and dustproof watch is the only watch qualified to withstand exposure to such conditions. It protects the movement from the salt air, ice, dampness, alkaline dust and heavy winds carrying always minute particles of dirt and dust.

Three views of the Depollier Waterproof Watch

Hon. Albert S. Burleson, Postmaster General
Hon. Otto Praeger, Second Assistant Postmaster General
L. T. Bussler, Chief of Maintenance and Equipment
J. Clark Edgerton, Chief of Flying Operations

US
AERIAL MAIL

PILOTS
Ira O. Biffle
Irving Graeb
Trent C. Fry
Leon D. Smith
L. V. Smith
Dunn K. Steele
Lyman W. Doty
Carroll C. Eversole
Dan Davison
Dana C. DeHart
Edwin W. Hubbard
D. I. Lamb

George Langley Conner, Chief Clerk to Second Assistant Postmaster Praeger
Charles M. Kight, Special Representative
John A. Jordan, Special Representative
Louis T. Bussler, Special Representative
Geo. R. Bowie, College Park, Md., Representative
H. Thomas, Belmont Park, L. I., N. Y., Representative
R. Smith, Bustleton, Penn., Representative

AVIATOR-MECHANICS
Christopher C. Cole
Julian Sykes
Wm. L. Lindley
August E. Carlson

New York-Chicago Aero Mail

Postmaster General Burleson has issued an official order directing the inauguration of the aero mail service between New York, Cleveland and Chicago on Wednesday, December 18. The planes to fly the route will be distributed to the various stations the end of this week and trial trips will be made over the entire route to acquaint the aviators with the landmarks of their new territory. The plane will leave the landing field at Elizabeth, N. J., at 6 o'clock in the morning, the mail being dispatched from New York City Post Office at 4 o'clock. The start from Chicago will also be made at 6 o'clock in the morning.

On a 10-hour schedule the mail should arrive at New York at 4 p. m. and on a 9-hour schedule at 3 p. m. It should arrive at Chicago at 3 p. m. on a 10-hour schedule, and at 2 p. m. on a 9-hour schedule. In order to maintain a 10-hour schedule the actual flying time must be at the rate of 75 miles an hour. With the actual flying time of the planes at the rate of 80 miles an hour a schedule of 9 hours can be maintained. With the 135 miles per hour DeHaviland and 135 miles per hour Curtis R-4 machines it is expected to be able to maintain a 9-hour schedule except in days of severe head winds.

Arrangements have been made to dispatch mail on train 140 leaving Washington at 9.25 p. m., which will include dispatches from Washington, D. C., Baltimore, Md., Philadelphia, Pa., Wilmington, Del., and Trenton, N. J., due at Elizabeth at 5.40 a. m., which, together with mail from the Elizabeth, N. J., Post Office, will be taken to the field for dispatch by aeroplane schedule at 6 a. m.

Mail from Newark, Jersey City, Brooklyn and New York City will arrive at the aviation field at Elizabeth by 5 o'clock in the morning.

Mail from St. Paul, Minneapolis, Milwaukee and points nearby Chicago should be dispatched so as to reach Chicago about 2 a. m. for eastern air mail dispatch at 6 a. m.

Letters by aeroplane may be registered. The rate of postage is 6 cents an ounce, with either the distinctive aeroplane stamp or an ordinary 6-cent stamp marked "By Aeroplane." Persons desiring their letters to be given special delivery service instead of regular carrier service after the arrival of the aeroplane may add to the aeroplane postage 10 cents for special delivery.

Over Two Millions for Aero Mail Lines

Appropriation of $2,185,000 for purchase of aeroplane and maintenance of air-line service for the Post Office Department which is an increase of $1,885,000 over the $300,000 originally estimated by the department, is recommended in the Post Office appropriation bill reported to the House by Representative Moon of Tennessee.

The bill carries recommendations for a total appropriation of $359,657,577. This is about $2,000,000 less than the appropriation for the present fiscal year, which was $361,477,577. The estimates of the Post Office Department for the next fiscal year amounted to $368,782,577.

Xmas Cards By Aero Mail

Christmas cards may be mailed by aeroplane service for 6 cents on or after December 15th. This is the first Christmas that it will be possible to send Christmas messages in this way.

Performance of Aviators During the Month of November, 1918

Total possible number of flights	104
Total possible mileage	11,336
Total perfect (uninterrupted) flights made	102
Total interrupted flights made	2

Pilot	Perfect Flights No.	Perfect Flights Miles	Forced Landings Interrupted Flights	Forced Landings Uncompleted Flights	Total No.	Total Miles
Dana C. DeHart	28	3,052	..	..	28	3,052
Robt. F. Shank	16	1,744	..	..	16	1,744
Max Miller	32	3,488	..	..	32	3,488
Edw. V. Gardner	12	1,308	..	2	14	1,526
Louis Gerston	4	436	..	..	4	436
Lawton V. Smith	10	1,090	..	..	10	1,090
Total	102	11,118	..	2	104	11,336

Aerial Mail Operation for the Month of November, 1918

Date 1918 Nov.	Miles Flown 1	Hours of Flying 2 Hrs.	Hours of Flying Min.	Mail Carried 3 A.	Mail Carried O.	Percent of Performance 4	Arrival 5 Wash.	Arrival N. Y.
1	436	5	58	26½	609	100%	4.30	2.25
2	436	5	54	40	509	100%	3.35	2.40
4	436	6	03	50	572	100%	3.54	2.10
5	436	5	37	32½	531	100%	2.55	2.59
6	436	5	49	31	603	100%	2.48	3.12
7	436	5	30	35	598	100%	3.00	2.50
8	436	5	36	35½	605	100%	2.45	3.05
9	436	6	33	44	575	100%	4.10	2.25
11	436	5	38	41	444	100%	3.01	2.56
12	436	5	18	31½	576	100%	2.43	3.03
13	564	7	14	29½	666	100%	3.10	2.40
14	436	5	44	30	567	100%	3.48	2.20
15	436	5	34	31½	589½	100%	3.40	1.55
16	436	6	20	30½	507	100%	4.12	3.05
18	201	3	04	31	529	50%	1.25 P.M.	2.50
19	436	5	51	35	652	100%	4.00	2.00
20	436	6	34	34½	305	100%	4.05	2.40
21	436	5	51	29½	582	100%	3.45	2.40
22	436	5	48	35½	626	100%	320	235
23	654	9	18	38	821	100%	3.25	3.08
25	872	12	30	30½	123½	100%	4.01	2.42
26	654	8	46	34	893½	100%	3.21	2.53
27	436	6	49	30	624	100%	4.08	2.50
28	436	5	21	31½	508	100%	3.26	2.47
29	436	5	24	28	615	100%	3.40	2.00
30	436	6	02	41	623	100%	4.32	1.50
	12,101	164	06	887	15,966½			

Note: Number of hours of dead flying for the month, 10 hrs. 41 min.

Explanation of Tabulation:

1. *Miles flown:*

Leg from Washington to Philadelphia	128 Miles
Leg from Philadelphia to New York	90 Miles

Miles flown for the day, whether one, two, three or four legs of the trip have been made. The aim is to get exactly the number of miles flown in connection with the mail service each day. Therefore, mileage of partial trips should be indicated.

2. *Hours of flying:*

To include the actual hours and minutes the machine is in the air with mail.

3. *Mail carried:*

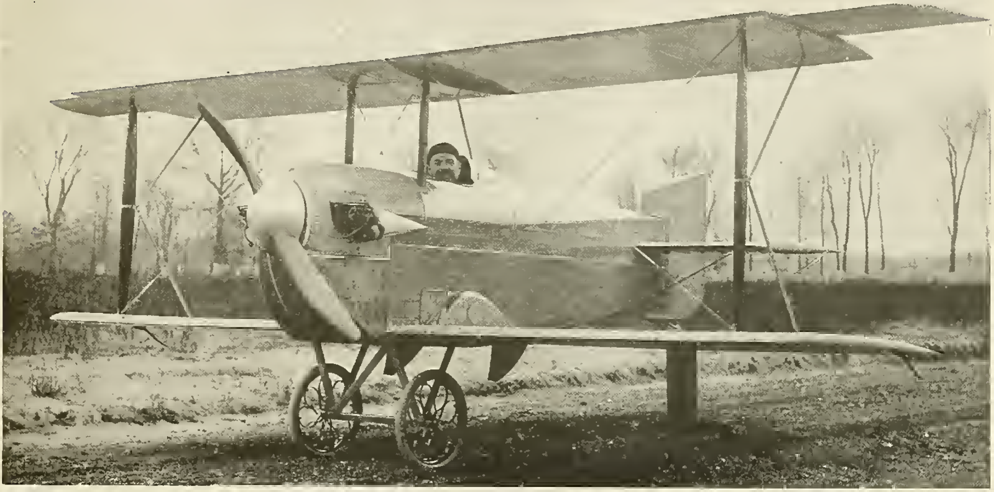
In this column, under A., give pound of aeroplane mail; and under O., give pounds of ordinary mail.

4. *Percent of performance:*

Round trip Washington-New York consist of four legs, each leg valued at 25% if completed by aeroplane and not by train before close of day.

Otto Praeger, Second Assistant Postmaster General.

THE MARTIN K-III SINGLE SEATER



SOME of the distinctive features of the Martin K-III, 45 h.p., single-seater, are retractable landing chassis, the K-bar cellule truss, wing end ailerons, and shock-absorbing rudder, which have been patented by Captain James V. Martin, the veteran aeronautic engineer. These features are interesting solutions of difficult aerodynamical and constructional problems and show the tendency of modern design toward the attainment of efficiency with low power rather than the employment of great power to overcome the disadvantage of uncertain design.

The K-III was designed as an altitude fighter, and is equipped with oxygen tanks behind the pilot's seat and provision for electrically heating the pilot's clothing. The seat is so located that excellent vision is obtained; vision vertical circle from dip of 5° dead ahead through an arc of 180°; horizontal circle 360°, transverse circle from dip of 27½° through an arc of 235°.

Captain Martin is opening offices at 299 Madison Avenue, New York City, where plans are already under way for building the K-III to sell for $2,000. The machine can light upon and start from a country road and can travel 22 miles on one gallon of gasoline, making it an economical means of carrying mail and light express in rural free delivery; for carrying newspapers, passengers, etc. In fact the cost of operation and maintenance is not much greater than for a Ford automobile, but the work is done ten times faster.

Dimensions

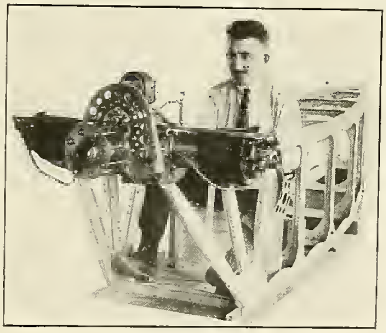
Span, upper plane (without ailerons)	15′ 0″
Span, lower plane	17′ 11¼″
Chord, both planes	3′ 6″
Gap between planes	4′ 6″
Length overall	13′ 3½″
Height overall	7′ 4¼″

Areas (Sq. Ft.)

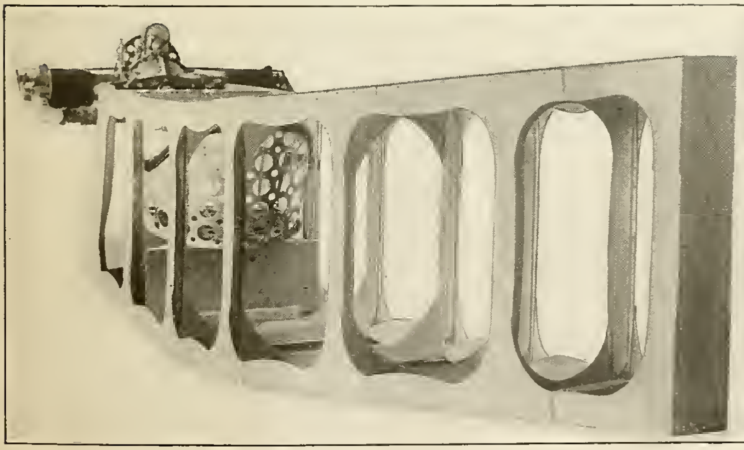
Upper plane (without ailerons)	52.50
Lower plane	47.80
Ailerons	5.00
Stabilizer	9.50
Elevators	6.66
Rudder	4.88

Weights (Lbs.)

Engine	85.50
Wings	60.75
Ailerons and supports	9.50
Chassis and retracting mechanism	16.38
Wheels	17.50
Struts, wires and K bars	8.25
Oil and gasoline tanks	9.75
Rudder and tail skid	7.75
Damper and elevator	14.50
Fuselage, complete	106.50
Propeller and hub	13.62
Total weight	350.00



Engine mounting, Martin K III Scout



Three-quarter rear view of the Martin K III fuselage

Performance (Estimated)

Altitude (Ft.)	Time (Min.)	Speed (M.P.H.)
0	0	135
5,000	3	113
10,000	6	112
15,000	11	111
20,000	18	108
25,000	28	97

(With 60 h.p., 100-lb. engine—speed 145 m.p.h. at 10,000 feet.)

Endurance at 10,000 feet:

At full power	222 miles
At minimum power	216 miles

Main Planes

The planes have neither stagger nor dihedral.

The aerofoil of main planes is known as the "Ofenstein 1." At 40 m.p.h. the Ofenstein wing section has a lift-drift ratio of 22 to 1.

Upper plane is in a single continuous span. Wing ends are at right angles to the leading edge, and are finished off with a semi-circular termination which varies in radius as the wing varies in thickness. The half-round wing ends are characteristic of all the aerofoils of the Martin K-III.

Principal wing spars for main planes are centered 14½″ back of leading edge, where the trusses carrying the lift are direct instead of bridged between the ribs.

The front of main wing beam is coincident with the most forward travel of the center of pressure.

The lower plane is in two sections, and attachment made to the fuselage. Wing ends are raked at an angle of 15 degrees.

Interplane bracing is of the "K-bar" cellule truss type. The head-resistance is reduced 4 per cent through the elimination of struts and wires.

The percentage of inter-cellule interference with the K-bar truss is 15% as compared with 25% in the standard truss; a total reduction of 40%. Of this reduction, 16% is due to the elimination of struts and wires while 24% is due to the increased gap obtained without subsequent weakening of truss or increase of structural resistance.

K-struts centered 14′ from one another. The vertical member is 4′ 3½″ long; greatest section, 1¼″ by 4¼″. The angular members of K-struts are attached to rear wing beams located 18″ back of main beams. These members are of steel tube faired with sheet aerometal.

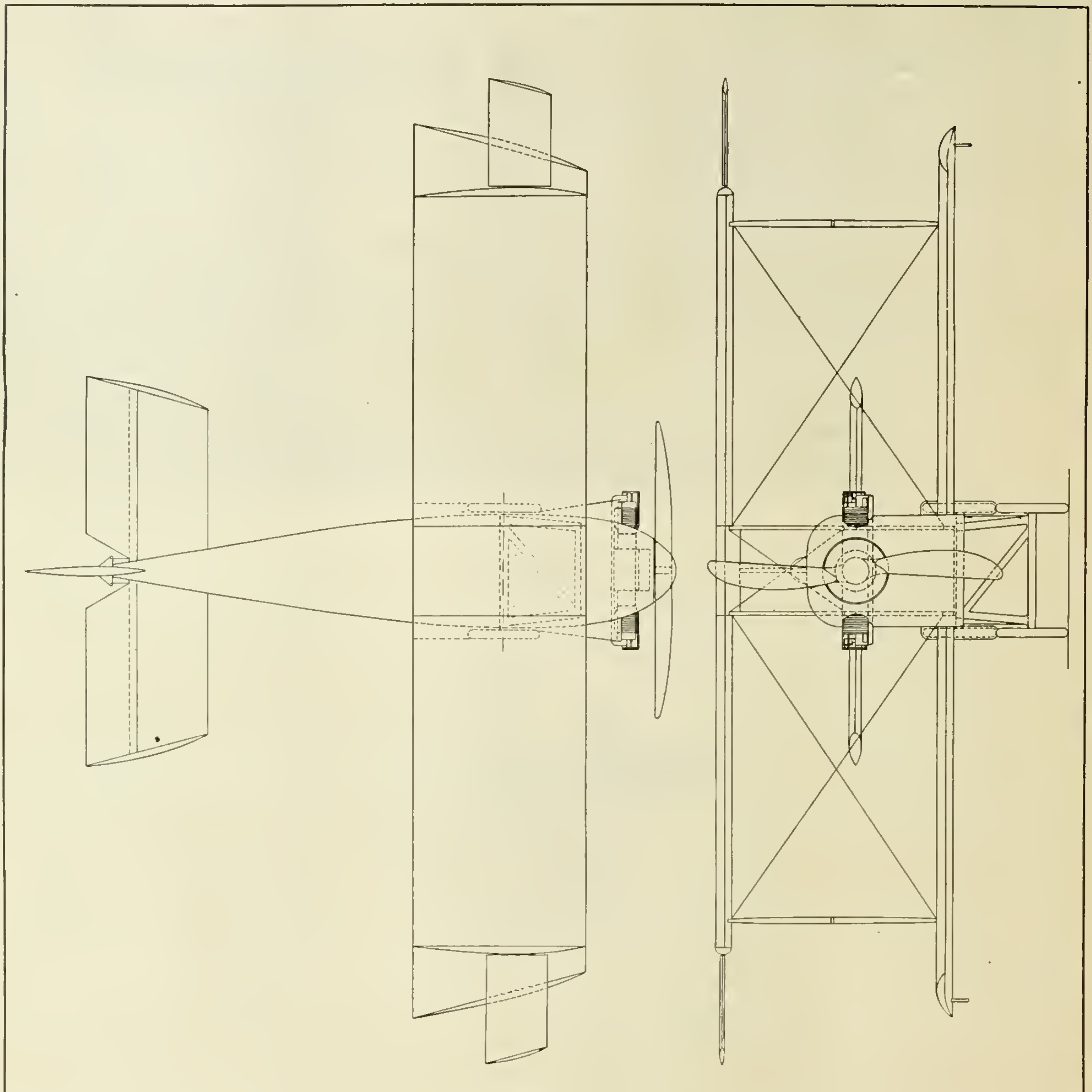
The vertical member of the strut is not subject to any bending moment at the juncture of the inclined members, for the upper member is in tension and the lower in compression, thereby neutralizing the forces at that point. The mid-strut fitting is designed with a view to equalizing the moments and relieving the vertical member of all except the usual direct compression.

Flying and landing wires are 3/16″ diameter. Center section cross-bracing is with ⅛″ diameter wire.

The wing-end ailerons are an unusual departure from customary aileron disposition. They have a righting influence per square foot of area of 4 to 1 with the added advantage that they do not impair the efficiency of the aerofoil to which they are attached.

The ailerons have a symmetrical double convex surface and are so balanced that their operation requires very little effort.

Ailerons are operated by means of a sliding rod running through the upper plane. Two cables running up the center panel struts cause the rod to slide from side to side. At the wing ends, the bar fits into a tubular collar attached to the ailerons. The collar is provided with a spiral slot or keyway through which a pin from the rod projects. The sliding movement of the rod causes a rotary movement of the aileron collar. This method does away with all exposed actuating members.



THE MARTIN
45 HP ABC ENGINE
K III SCOUT

THE MARTIN K III SCOUT

(*Continued from page* 759)

Fuselage

Overall length of fuselage from engine plate to rear termination, 10′ 10$\frac{7}{16}$″. Maximum depth, 3′ 0¼″ (not including streamline head rest); maximum width, 2′ 2⅜″.

The center of gravity is located 2′ 7½″ back of the engine plate.

Veneer of ply-wood is used for the internal construction of the fuselage.

In flying position, the top of the rounded turtle deck is practically horizontal. The upper longerons as well as the lower have an upward sweep towards the rear. The fuselage terminates in a vertical knife edge 18″ high.

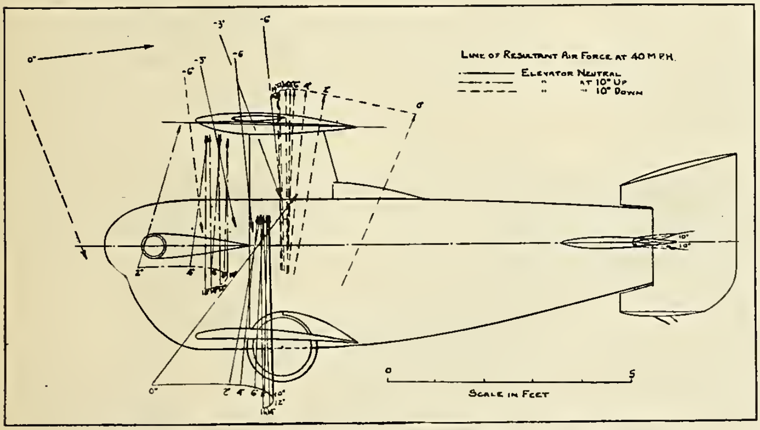
Internal bracing of the fuselage is with solid wires looped over clips at the ends of cross-bracing members. Wires are run in series of four each, grouped in ribbon form. Each wire has a tensile strength of 250 lbs. each; at the cross-braces, they run over a $\frac{3}{16}$″ radius. Only eight groups of wires and eight turnbuckles are required in the internal bracing system.

The cowling and propeller spinner are of "aerometal," having the tensile strength of sheet steel at one-third of the weight of steel.

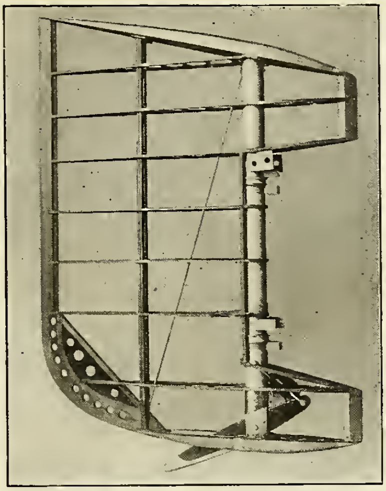
Where engine cylinders project from the body, half-conical formers carry out a streamline.

The fuselage is designed to stand a load of 105 lbs. per sq. ft. of horizontal tail surface. Factor of safety, six.

Instruments carried are: Altimeter, tachometer, gasoline gage and oil gage.



Graphic results of wind tunnel test of the Martin K III Single-Seater



Martin K III rudder and tail skid

Tail Group

The horizontal stabilizer has a span of 7′ 6″ and width of 2′ 6″. Ends are raked at a 15° angle.

The stabilizer is located in line with the center of thrust. It is fixed at a non-lifting angle and supported from below by a pair of steel tube braces.

Elevators are 12″ wide and have an overall span of 7′ 10″. For rudder clearance, the inner ends of elevators are raked 30°.

Rubber covering between stabilizer and elevators closes the gap between the surfaces, giving a smooth, unbroken outline.

There is no fin.

The rudder is provided with balanced areas above and below the fuselage.

The tail skid is contained within the rudder. It is provided with rubber elastic shock-absorbing cord similar to the customary practice. It is especially effective when taxying on the ground. The combining of the rudder and tail skid does away with considerable weight and air resistance while adding to the effectiveness and simplicity of the construction.

The rudder is 1′ 10″ wide; maximum height, 3′ 5″; balanced portions project 8″ forward of the principal rudder area.

Flexible 3/32″ cable is used for operating the rudder, by means of the usual foot bar.

The elevators are actuated by means of a single ⅜″, 20-gauge steel tube from the control stick to a lever projecting downward from the center of member forming the elevator leading edge. The fuselage terminates beyond the elevator leading edge, providing space for the enclosure of the operating lever.

Landing Gear

Ackerman spring wheels are used for the landing gear; these have 2″ tires, and are 20″ in diameter. The two wheels weigh 17½ lbs. Wheel track, 2′ 5″. When the chassis is extended, the underside of the fuselage at the forward end is raised 2′ 3″ above the ground. When drawn up during flight, only the wheels are exposed.

The front of axle and the two forward struts have flat front faces, so that when in flying position, these members fit flush into the fuselage bottom.

A hand-operated worm gear, operated during flight, causes the chassis to be retracted with practically no effort on the part of the pilot.

The landing gear has a factor of safety of 20.

Engine Group

The power plant consists of an air cooled two-cylinder opposed "Gnat" A. B. C. engine, developing 45 h.p. at 1950 r.p.m.

Fuel consumption, .56 lbs. per h.p. per hour; weight, 50.4 lbs. Oil consumption, .017 lbs. per h.p. per hour; weight, 1.55 lbs.

The fuel tank is located in the upper main plane above the fuselage. It has a capacity of 9.03 gallons, sufficient for a flight of two hours.

(*Continued from page* 754)

"Believing that the time is here when aircraft can be used to great advantage and saving of time for carrying passengers and express, a group of prominent and public spirited Americans have asked me to establish and take complete charge of the first permanent passenger and express aerial lines.

"I agree with them that it would be a splendid achievement and that it would be very appropriate to take this initial step December 17—the fifteenth anniversary of the first aeroplane flight made by Orville Wright at Kitty Hawk, N. C.

"It is our intention to put the first of these lines in operation May 15, 1919. We have gone into the details of the plan very carefully, as we realize that the demand for aerial transportation lines no doubt will be very extensive."

Captain Lipsner said the planes would be capable of carrying forty passengers of their weight equivalent in express matter; that rates would be nominal and within the reach of all; that a regular schedule of arrival and departure would be maintained and that all modern conveniences would be offered to patrons, such as wireless telephony, stationery and all latest scientific appliances.

The company will carry its own insurance for passengers and cargo.

A regular schedule of departure and arrival will be maintained. At a later date announcement will be made of what rebate will be offered for every minute the air craft is late.

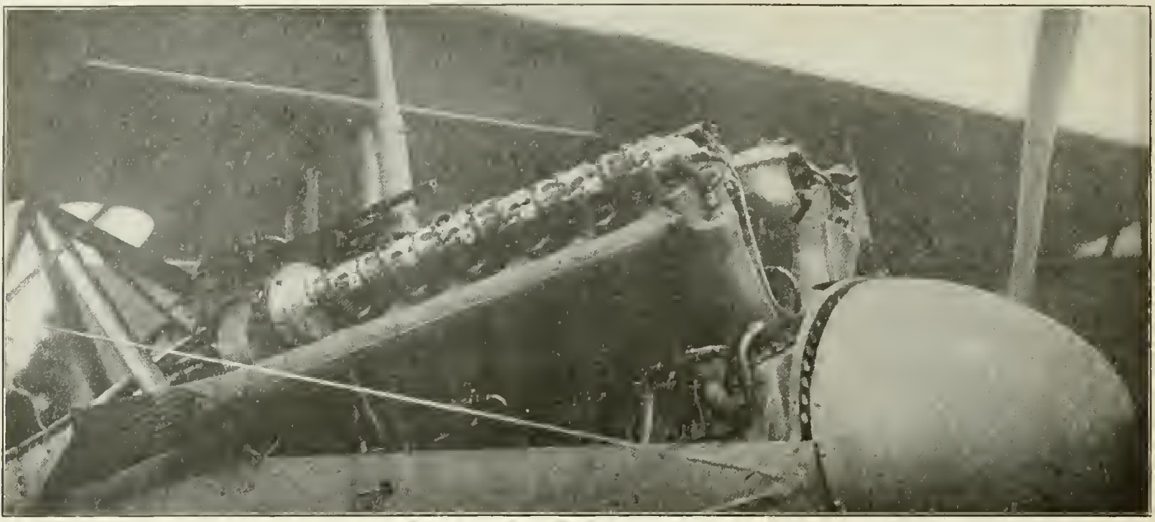
Perishable goods and express will be carried during the first year's operation.

Aeroplanes can be chartered for special trips or for certain altitudes.

Only the most expert aviators will be employed.

Pilots will receive an interest in the company besides substantial salaries, the interest only in force when all rules and regulations are strictly obeyed.

Representatives and officials of the press and aeronautical bodies will be taken on the first round trip flight.



The Liberty Twelve in an American Biplane

THE LIBERTY MOTOR

By G. DOUGLAS WARDROP, M. S. A. E., A. S. M. E.

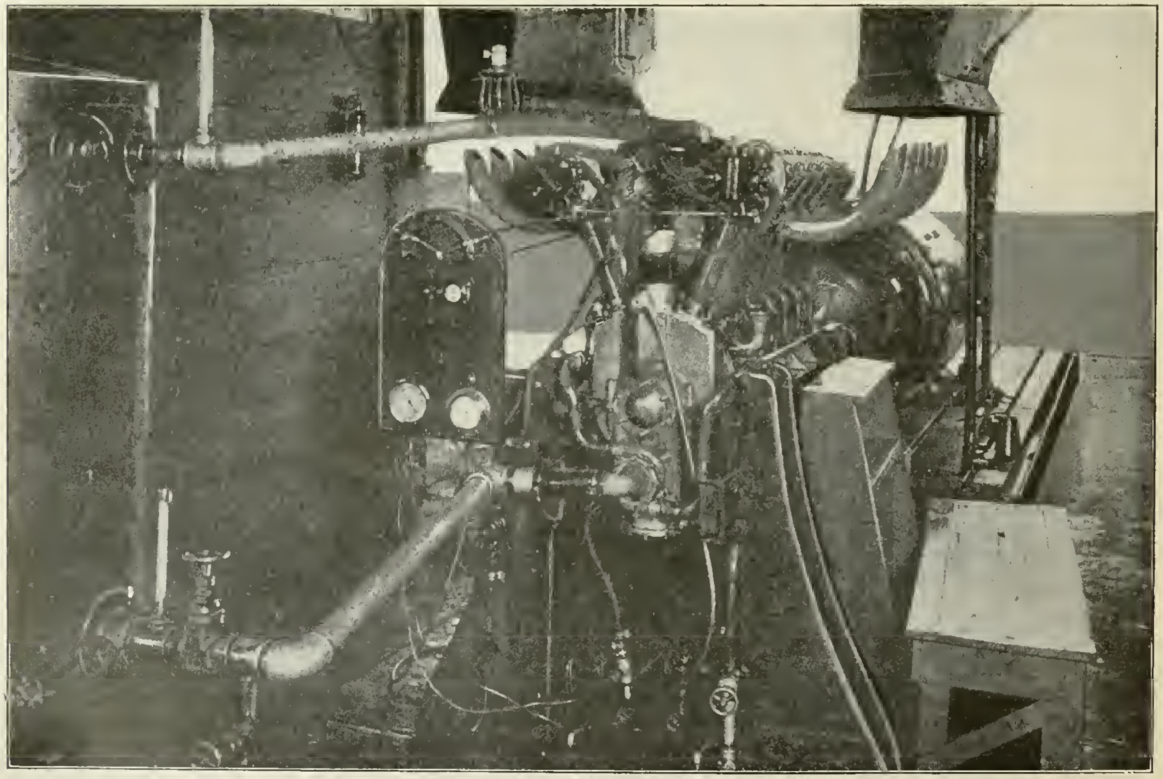
(Continued from last issue)

Oiling System

THE oiling system in the Liberty Twelve is an interesting feature, as will be seen from the illustration. The crankshaft is hollow, and in the center of each main bearing a radial hole is drilled through the shaft into the hollow center. This hole in the shaft registers with the corresponding hole in the bearing hushing, once every revolution of the shaft, at which time a small quantity of oil is forced through into the hollow crankshaft. A passage leads from each hollow main bearing to the adjacent crank pin, which is also hollow. A radial hole is also drilled through each crank pin and carries the oil out on the surface of the pin. Oil grooves and passages in the connecting-rod bushings insure proper lubrication for both the forked and plain connecting rods.

The excess oil thrown off the rapidly-moving connecting rod ends forms a mist which lubricates the piston pins and the cylinder walls.

Part of the oil conducted to the main crankshaft bearing at the propeller end of the engine goes through a passage around this bearing and up through pipes to the propeller end of the camshaft housings. From the end of the camshaft housings it is led around the end camshaft hearing to a passage drilled diametrically through the bearing



Liberty Twelve on a Sprague dynamometer testing stand at the Trego Motors Corporation plant midway of its length. Once every revolution of the camshaft a hole drilled through the camshaft into its hollow center registers with the oil passage through the bearing.

Thus once every revolution a small quantity of oil is forced into the hollow camshaft.

The oil is led through the camshaft and out through holes drilled in it to each camshaft bearing. The excess works out of the ends of these bearings and collects in small reservoirs to a depth of about ¼". The cams, in revolving, dip into this oil and splash it over the cam rollers and into pockets in the rocker-lever shafts. From these pockets it is led through the hollow rocker shaft to the rocker-shaft bearings.

The excess oil eventually finds its way to the gear end of the camshaft housings, over the gears and down the driveshaft housing into a chamber just above the oil pump.

The excess oil thrown off in the crankcase by the connecting rods collects in this same chamber when the engine is inclined so that the propeller end is high. If the propeller end of the engine is low, this oil collects in a small sump or chamber at the propeller end of the crankcase.

Immediately above the oil delivery pump is located an oil return pump consisting of three gears, and driven by the same shaft as the delivery pump. The function of this oil return pump is to draw excess oil out of the crankcase and return it to the oil reservoir. One-half of this pump draws oil from the sump at the propeller end of the crankcase and the other half draws oil from the sump at the distributor end of the crankcase. Both halves of the pump deliver oil to the connection on the left side of the oil pump body marked "Oil Out," from which point it returns to the oil reservoir.

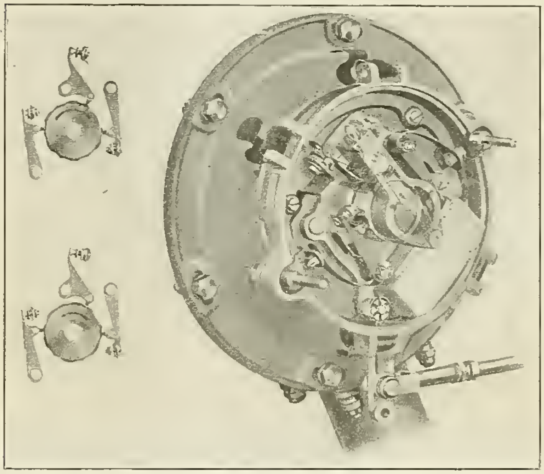
Electric Ignition

As was stated in our last issue, the ignition system used on the Liberty Twelve is known as the generator-battery type. Described in detail, the system comprises two independent breaker and distributor mechanisms or heads, identical in every respect and each one firing all twelve cylinders. These distributors are supplied with electrical energy from two sources. For starting and for idling speeds up to 650 r.p.m. current is drawn from a specially constructed four-cell storage battery. The battery is very light and carries very little liquid or electrolyte (barely enough to fill a hydrometer syringe besides what is absorbed by plates and separators). Nevertheless, it has sufficient capacity to ignite the engine at full speed for three hours. It is so constructed that, even though it be turned upside down, it will still continue to function properly.

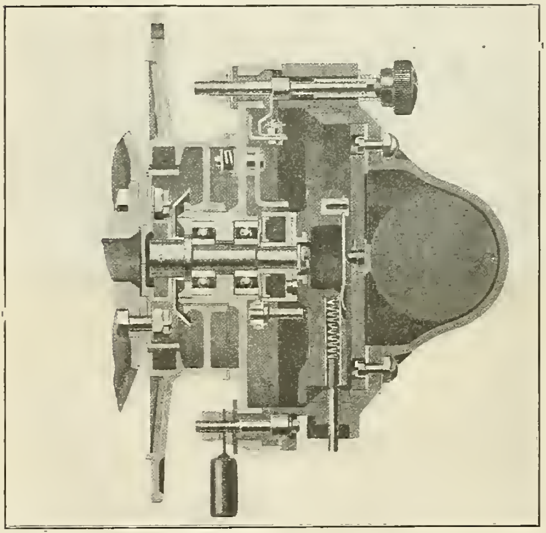
In addition to the battery, a positively driven generator is provided, so geared that it runs at one and one-half times crankshaft speed. Electrical energy for starting and idling speeds is supplied by the battery. As the engine speed is increased the generator "builds up" and its output grows greater, until at about 650 r.p.m. the generator voltage equals that of the battery. The maximum generator output exceeds the requirements for ignition so that at speeds above 650 r.p.m. the direction of flow of current is reversed and the excess output of the generator goes to recharge the battery. With an almost discharged battery the rate will be about 10 amperes, but will diminish as the battery voltage rises until the battery is completely charged, when the charging rate will be just sufficient to maintain it in a properly charged condition.

The generator is controlled by a "voltage regulator" which prevents the output exceeding a pre-determined figure. In view of this fact, the generator will supply current for ignition indefinitely, without the battery, so long as the engine speed is not allowed to drop below 500 r. p. m.

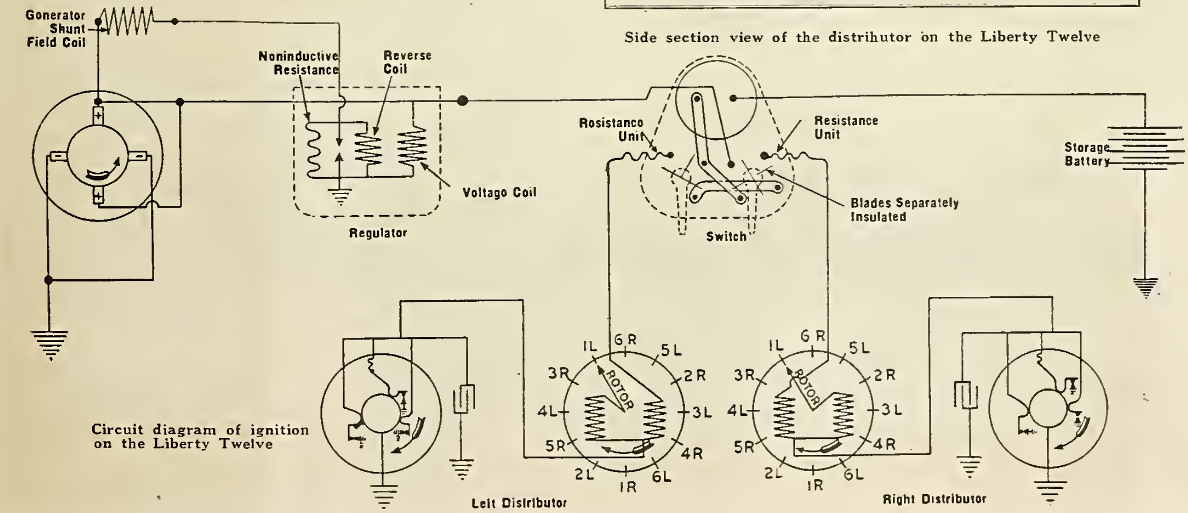
A duplex ignition switch is provided which will permit either one or both distributors being turned "on." This switch is so constructed that



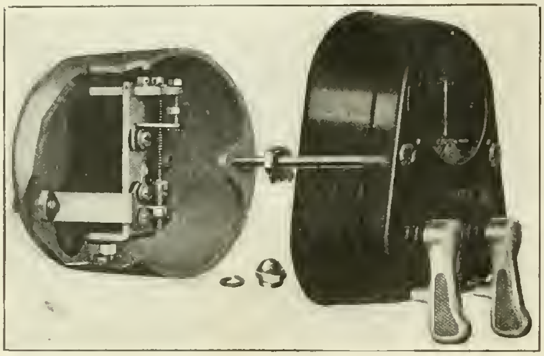
The distributor mechanism of the Liberty Twelve

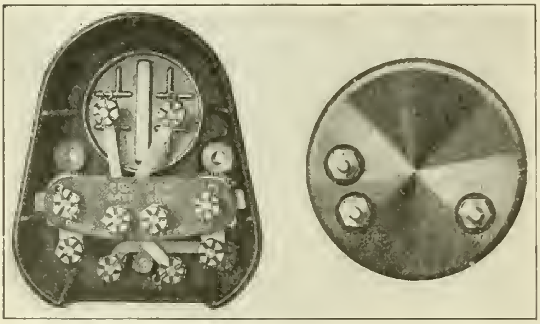


Side section view of the distributor on the Liberty Twelve



Circuit diagram of ignition on the Liberty Twelve either set of ignition alone can be used without connecting in the generator. In starting, only one side should be used, as, with both switches "on," the generator is connected to the battery. Under these conditions the discharge from the battery through the generator before the engine is started would be an excessive drain on the battery. It is essential that both switches be "on" at all flying speeds. The ignition switch has an ammeter incorporated in it and this ammeter should be watched occasionally, as it indicates the amount of current flowing to or from the storage battery. If the ammeter shows a discharge at any speed above 650 to 700 r. p. m. with both switches "on," it is an indication that something is wrong with the generator circuit and that all electrical energy is being supplied by the storage battery. If the ammeter stands at zero under the same conditions it indicates that the storage battery is not receiving a charge, but that the ignition is being carried by the generator.


The voltage regulator on the Liberty


Voltage regulator

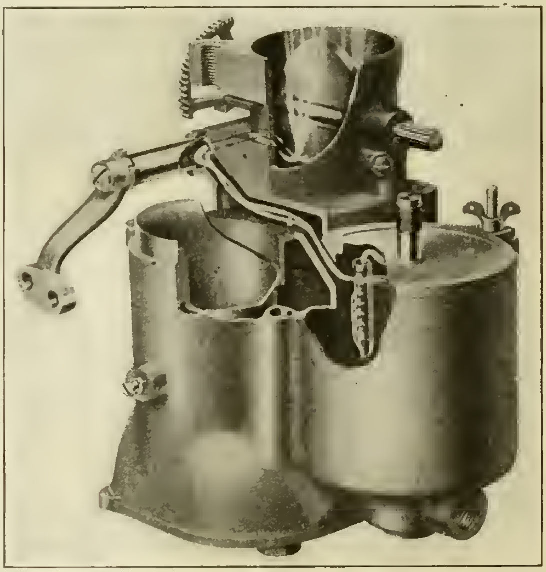
To return to the distributors—the circuit-breaker mechanism for each head is identical with that used in any high-grade magneto, with two exceptions, as follows:

Two main circuit breakers, connected in parallel, are provided instead of one. The two breakers are timed to operate simultaneously and are provided in duplicate as a precautionary measure.

An auxiliary circuit breaker, the function of which is to prevent the production of a spark when the engine is turned backward or "rocked" is also provided. This auxiliary breaker is connected in parallel with the other two through a resistance unit which reduces the amount of current flowing through it. The breaker is so timed that it opens slightly before the other two when the engine is turned in a forward direction. The opening of the main breakers then results in the production of a spark. When the engine is turned in a backward direction the two main breakers open first and no spark is produced, due to the fact that the current continues to flow through the coil through the auxiliary breaker, but in diminished quantity, due to the resistance unit. By the time the circuit is opened at the auxiliary breaker the intensity of the magnetic field of the coil has weakened to such an extent that no spark is produced. A transformer coil is incorporated in the Bakelite cover of each distributor head.

The Part of Zenith in the Liberty Aircraft Engine Programme

The first important decision of those engineers who were called upon to design an aeroplane engine which would uphold America's Air Programme was to incorporate only those things in their engine that were of proven and established quantity. It was therefore only natural that in considering the important matter of carburetion that the Zenith engineering force was called upon to design the Liberty Engine Carburetor.


Section diagram of the Duplex Zenith Carburetor

The first Liberty tested on Pikes Peak. In the group are L. J. Hall, of the Hall-Scott Co.; Lynn Reynolds, U. S. Inspector; V. I. Shobe, of the Zenith Carburetor Co.; Ferdinand Jehle, of the Aluminum Castings Co., and E. L. Graham, U. S. Inspector

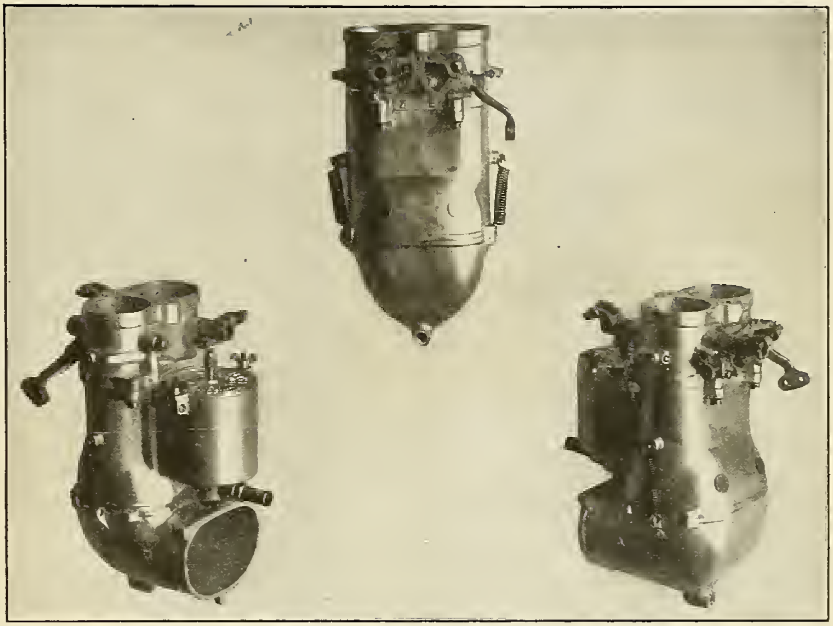
The Zenith organization, always progressive, were pioneers in aeronautical carburetion. Their early experience was with Anzani, whose aero engines created a sensation in the early days and made possible some of the most important advances in the science of flying heavier-than-air machines. In America the Zenith was long ago adopted by Curtiss, and the unvarying reliability of the Zenith instruments assisted greatly the Curtiss advance to undying fame in aeronautics.

When the great war broke out in Europe Zenith was used, among others, on the aeroplane engines built by Salmson, Isotta Fraschini, Renault, Peugeot, Clerget and Lorraine-Deitrich, and was quickly adopted as standard equipment on the Hispano-Suiza engine, which leaped to a first place in the yet unbeaten Spad machine.

It is easy to understand how the combined efforts of Zenith factories located in France, England, Italy and America, interworking in their experiences, should lead to the development of the last word in carburetion. With all this experience, and results of combined efforts before this, the Zenith designers, V. R. Heftler and H. de

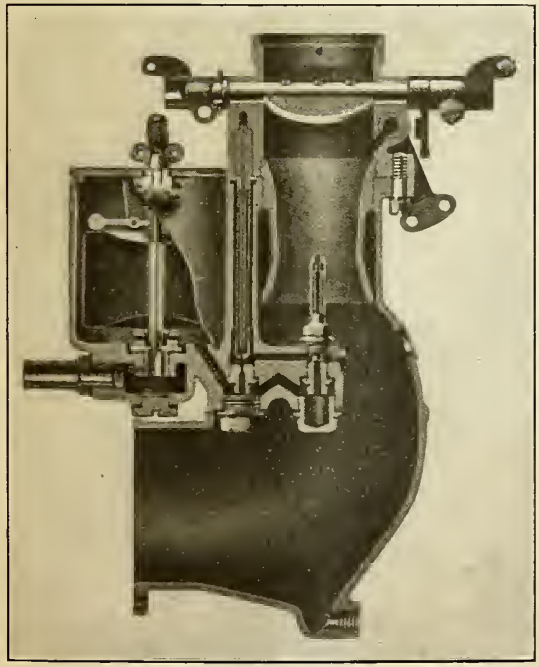
Boischevalier, developed a carburetor which met with the instant approval of the engine designers and which, when tested on the first Liberty Engine in July, 1917, justified the faith put in them and their product.

Immediately after the successful 50-hour test of Liberty 12 Engine No. 1 at Detroit, an experimental expedition composed of E. J. Hall, one of the Liberty Engine designers; Lynn Reynolds, of the National Advisory Committee for Aeronautics; E. L. Graham, I. A. & A. E.; V. I. Shohe, of the Zenith Carburetor Company; S. Smith, of the Hall-Scott Motor Company, and Ferdinand Jehle, of the Aluminum Castings Company was sent to Pike's Peak, Colorado, to make tests of the Liberty Engine at various altitudes. These were very carefully conducted and were run at altitudes above sea level of from 6,000 feet at Colorado Springs, to 14,109 feet at the summit of the peak. They demonstrated effectively the suitability of the engine for its destined purpose, and, incidentally, justified the selection of the Zenith carburetor. A very noteworthy fact is that the carburetor adjustment, which was determined as giving maximum power and efficiency on the electric dynamometer test at the Packard factory in Detroit, approximately 200 feet above sea level, gave the best results on the summit of Pike's Peak, 14,109 feet above sea level. This is only possible with a carburetor of plain tube construction and having the natural automatic compensating feature made possible by the Zenith system.



Three views of the Zenith carburetor equipment on the Liberty

After exhaustive tests had resulted in the final details of adjustment and installation production was started at the Zenith factory. The Zenith manufacturing department, already experienced in high-class accurate workmanship and productive ability, carried on the good work started by the engineering department, and with such success that by November 1st, 1918, when Liberty Engine production had reached its peak, there had been delivered to the engine manufacturers a quantity of these instruments which was in excess of requirements to the extent of a month and a half of engine production according to the schedules then in effect.



Section diagram of the Zenith carburetor

Two of these carburetors are used on each Liberty 12 Aircraft Engine, they being of Duplex type, i. e., each having two carbureting chambers, or barrels, supplied from common air and fuel sources. Each barrel has a venturi tube for measuring its proper amount of air; one main or variable flow jet, and one compensating or constant flow jet. These are of non-adjustable type, being fixed once and for all, two carbureting chambers, or barrels, supplied from common air and fuel sources. Each barrel has a venturi tube for measuring its proper amount of air; one main or variable flow jet, and one compensating or constant flow jet. These are of non-adjustable type, being fixed once and for all, and so close are they calibrated that each and every Liberty Engine has its carburetors fitted with the same sized jets. With the exception of the altitude adjustment, which is incorporated in the design of Zenith aeronautical instruments to take advantage of the lesser air density met with at high altitudes and thus perform the important function of saving fuel and increasing the radius of action of the aeroplane, these carburetors have identically the same principle of operation, and same disposition of jets and venturi, as is used in Zenith commercial instruments.

The altitude adjustment mentioned above consists merely of a valve, connected so as to be manually operated by the pilot, which, when opened, puts the interior of the carburetor barrels below the throttle, where a partial vacuum exists, in communication with the fuel chamber. The suction from the barrels reduces the pressure in the fuel chamber and thus causes a decrease in the amount of fuel passing through the jets. At approximately 18,000 feet altitude this adjustment makes possible a saving of about 30% in fuel consumption, or, in other words, increases the radius of action of the aeroplane by 30%.

Immediately preceding the signing of the Armistice the Zenith company had developed a carburetor which was adopted as standard equipment for the Eight-Cylinder Liberty Aircraft Engine, and which was slightly later to replace the original model on the Twelve-Cylinder engine, that was as much ahead of the original Liberty Engine carburetor as it was ahead of other aeronautical carburetors at the time of its adoption. Aeroplane development resulting in greater climbing angles and higher ceilings made necessary equal developments in carburetion to meet these newly imposed requirements. The two points of carburetion mostly affected were, first, the ability to function properly when tilted to extreme angles; and second, to have an extended range of altitude adjustment. Still utilizing the same proven principles of operation, but by changing manufacturing details and relative positions of jets, and by a new float mechanism design, these requirements were not only met, but were exceeded. With a carburetor of this type a Liberty Engine was successfully operated at maximum power higher than that obtained with the original instrument at fore and aft angles of tilting of 50°. A tilting of 45° sidewise is also possible with the engine on a stationary stand. (In flight this sidewise tilting, as met with in banking, does not affect the normal functioning of the instrument, due to the "bicycle balance," or the neutralizing of the force of gravity by the centrifugal force.) It is well worthy of mention that, with this new type of instrument, the power of the Liberty Engine was increased, and the fuel consumption was considerably decreased. In addition, and of importance, the heat loss through the jackets was appreciably reduced.

THE HISPANO-SUIZA AVIATION MOTOR

By E. H. SHERBONDY

The following article is one of the chapters of the first Textbook of Aero Motors written by the author and being published by the Century Company.

The author is the well-known authority on internal combustion engines and aeronautic engineering. He has made a thorough study of problems of aeronautic engineering, especially of power plants, and has applied his vast knowledge of engineering, including matallurgy, and his remarkable inventive genius to work out their solution. He has achieved remarkable results and this Textbook represents the only work issued so far which deals with all the elements of the problems of applying the internal combustion motors to aircraft.

Mr. Sherbondy is a consulting member of the Naval Consulting Board, consulting engineer to the Aeroplane Engineering Department of the Bureau of Aircraft Production, and well known as the author of important works on internal combustion engines and aeronautic and automobile engineering.

THE Hispano-Suiza motor is the product of the brains and genius of Marc Birkigt, a Swiss civil engineer, who commenced his motor work in the design and construction of the now famous Hispano-Suiza motor cars, at Barcelona, Spain, about 1906.

A factory was established shortly afterward in Paris, and the majority of the work was carried out there, as the factory was near to the material and skilled labor markets.

When the French government established the present system of tax rating on motor cars, in which the horsepower was considered a function of the bore only, certain motor car firms commenced the construction of small bore, long stroke motors, in this way increasing the horsepower for a given cylinder bore and evading the taxation. Competitions were inaugurated for motor cars, having as their basis, limiting the cylinder displacement.

The Hispano-Suiza Co. rapidly entered a place of first rank by winning many of these competitions and assured for themselves an enviable reputation amongst continental motor constructors.

When the Great War commenced, the Germans had already developed the now famous steel cylinders Mercedes and Benz motors, whose performance from every standpoint was far superior to aviation motors built in other countries.

The French at this period had developed the rotary steel cylindered, air cooled motors to a high degree of reliability, but their fuel and oil consumption was then and is now excessive.

The need for a non-rotating high powered motor was met in the Hispano-Suiza motor which were found so satisfactory and so far superior to other non-rotating motors offered for trial at that time, that the French, British and Italian Governments placed orders for large quantities of these motors.

Such important firms as Peugeot in France and Wolsely in England, gave up the building of motors of their own design to take up the construction of the 150 H. P. Hispano.

The Hispano motor has since been developed in a large number of sizes and types, for military aviation purposes, and fifteen different manufacturing companies in different part of the world have constructed more than 50,000 of these motors.

The design and construction is unique in many particulars, as will be seen from the following description.

The motors are built with eight cylinders, with cylinders forming a 90° V in every case. This angular setting of the cylinders results in absolutely uniform turning effort on the crankshaft, the power impulses being equally spaced from one another, at 90 degrees.

The motor is unbalanced only in the horizontal plane, but the magnitude of the unbalanced forces is so small as to not be noticeable in the actual operation of the motors.

The motors have been built in both direct and geared down types and operated at various speeds from 1450 R.P.M. to 2200 R.P.M.

The 150-180-200 and 220 H.P. types all have identically the same cylinders. The bore and stroke are respectively 120 x130 mm. or 4.72x5.12 inches. The variation in the H.P. is obtained by fitting large carburetors and induction pipes, the use of higher compression ratios and higher speeds in the high power types.

There have also been built in limited quantities, the 400 and 450 H.P. types with 16 cylinders. The various types, and characteristics of other sizes are given in the Table I.

Table 1

Type	Normal H.P.	Normal R.P.M.	Max. H.P.	Max.R.
150	150	1450	200	2000
180	180	1540	250	2240
200	200	1870	210	2200
220	220	1970	238	2200
400	400	1870	500	2240
450	450	1970	476	2200

Fig. 2 shows the Brake Horsepower curves of the 150, 180, 200 and 220 H.P. types, as well as the 400 and 450 H.P. types.

For the 150 H.P. type a 48 D. C. Zenith Carburetor is used, on the other types of higher H.P. the 58 D. C. Zenith Carburetor is used.

The 400 and 450 H.P. motors both have the crankshaft geared to the propeller shaft, through parallel trans of helical reduction gears, as is indicated by the diagram Fig. 3. It will be noticed that the crankshaft is divided into two independent units. By this artifice, the shaft size is kept the same as in the 200 H.P. type motor, the torque magnitude being only 50% of what it would be if a single crankshaft were used for the sixteen cylinders.

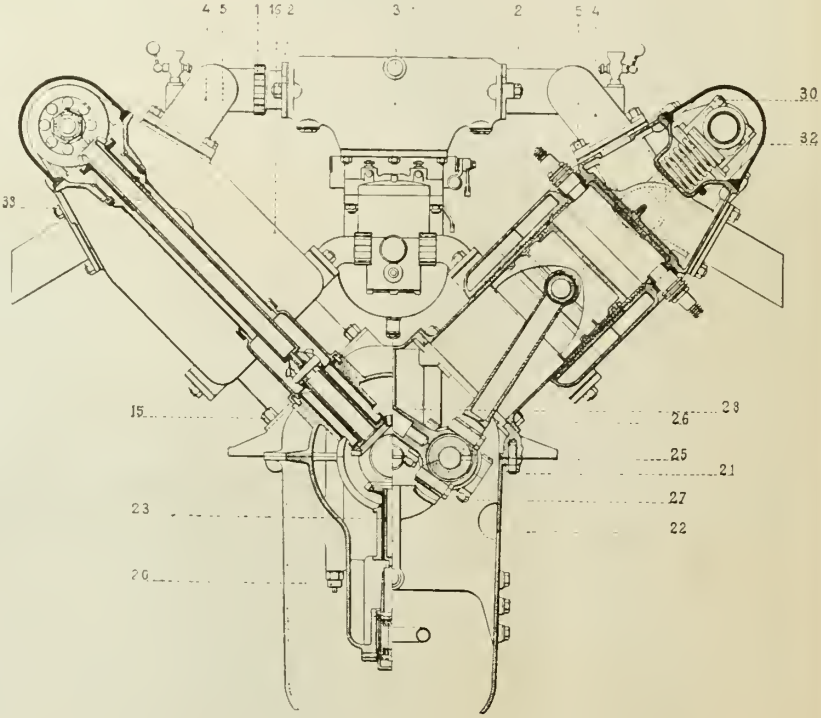


Fig. 1.

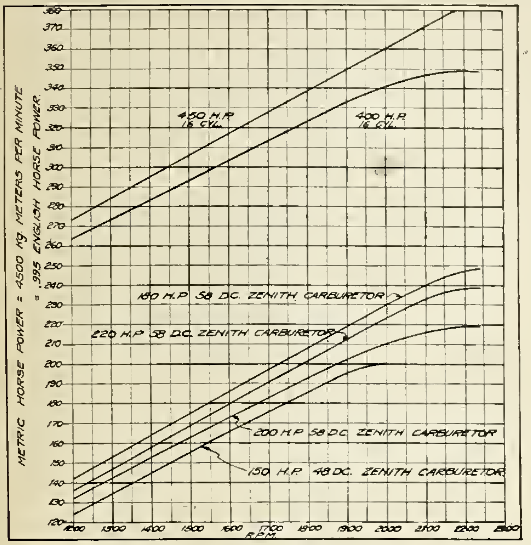


FIG. 2

Fig. I is a section taken at right angles to the motor crankshaft of the 150-180-200-220-H.P. types.

The Cylinders

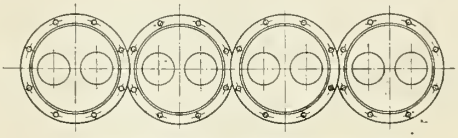
The cylinders are machined from hollow steel forgings of .40 carbon steel and weigh when rough about 40 lbs. for the smaller motors. Their finished weight is about 11 lb.

The cylinder form is a hollow barrel, with a closed end, into which the valve ports are cut. The cylinder walls have, when finished, an average thickness of 2 mm. or .078, and they are externally threaded from the closed end down, and the cylinder head is 5 mm. or .187 inches thick and the bolting flange, by which the cylinders are retained on the crank case is 6 mm. or .2362 inches.

The steel cylinder barrels are assembled in groups of four by screwing them into the cast aluminum water jackets, which are tapped to receive them. The steel barrel is put in the aluminum jacket after which the valve ports are machined in place, being located from the valve stem guides in the aluminum jacket. The bolting flanges are so designed as to interlock with one another when in place as is illustrated in Fig. 4.

After machining and putting in the steel barrels and valve seats the cylinder jacket is cleaned with alcohol and then given three coats of enamel inside and out, the bore is then given the final size by grinding.

It will be seen that a number of advantages accrue from this form of construction. Welding and the attendant possibility of distortion are done away with, and the desirable features of great strength, together with minimum weight, is attained.



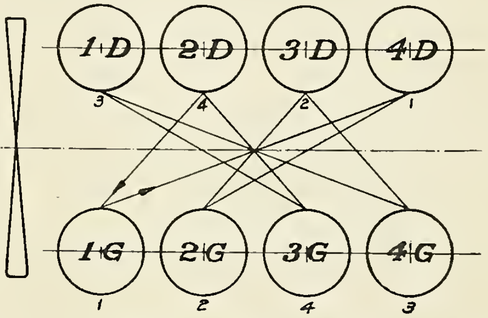
METHOD OF INTERLOCKING BOLTING FLANGES

FIG. 4

Some very ingenious processes have been devised to make the accurate production of these cylinders possible.

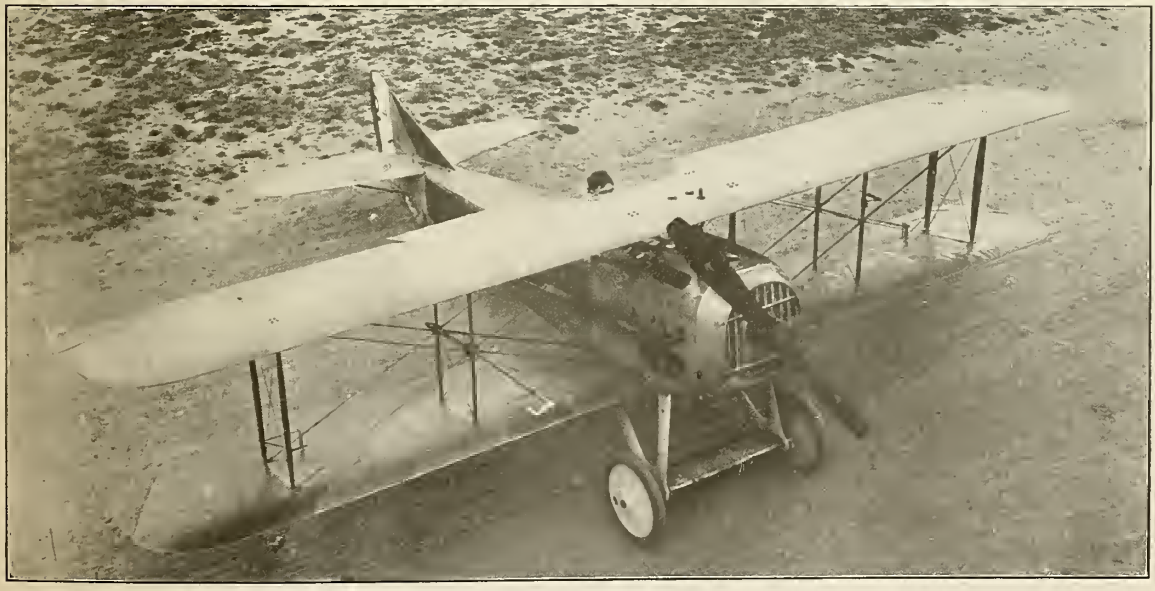
The lower portion of the camshaft housing and the oil drain passages are formed in the top exterior of the jacket.

The intake and exhaust ports are both 51 mm. = 2 inches in diameter.



FIRING ORDER HISPANO SUIZA 8 CYL. MOTOR

FIG. 5



The French Spad biplane equipped with Hispano-Suiza motor

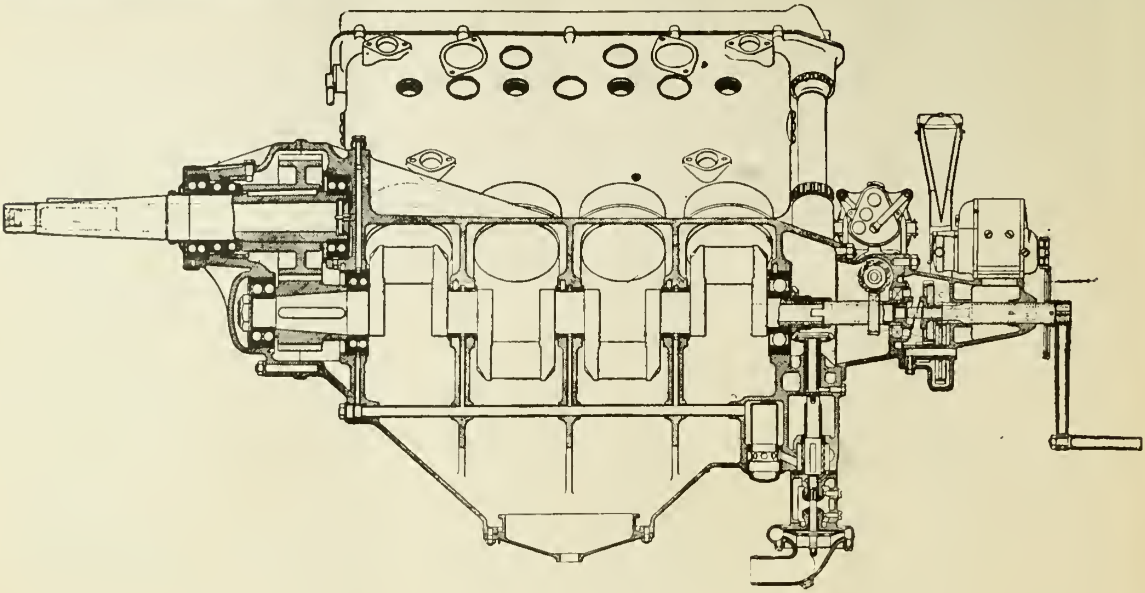


Fig. 6.

The exterior appearance is extremely clean cut, as can be seen from the accompanying illustrations.

The Pistons

The pistons are aluminum alloy sand castings, thoroughly well ribbed to assist in cooling. The piston head is flat and has an average thickness of 7 mm. (.2/5"). The piston skirt has an average thickness of 3 mm. (.118"), and carries three rings 5 mm. (.196") wide, which are made of cast iron. Four narrow rings two in each of two grooves are placed above the gudgeon pin center and one below. The latter acts as an oil scraper ring. The location of the gudgeon pin center varies following the different compression ratios used.

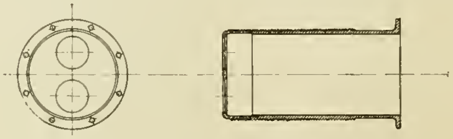
The Gudgeon Pins are of Chrome nickel steel 30 mm. (1.181") outside diameter and 22 mm. (.866") inside diameter and are prevented from turning in the piston pin bosses by a single grub screw.

Connecting Rods

The connecting rods are of the forked type. The body of each rod is a tube 27 mm. (1.06") outside diameter and 21 mm. (.826") inside diameter, made by drilling straight through. They are made of B. N. D. Chrome Nickel steel, famed throughout the world for its wonderful physical properties. The top and bottom of the rods are profile milled to shape and polished all over.

The gudgeon pin bush in the small end of the rod is of phosphor bronze 57 mm. (2.24") long, and has a wall thickness of 2.5 mm. (.09").

The rods are 227 mm. (8.93") centers, somewhat less than two piston strokes. Short connecting rods are the rule in aviation motors, since they enable the motor to be kept compact and light, although the secondary unbalanced forces in the motor are increased thereby.



HISPANO STEEL CYLINDER BARREL

Fig. 7

Crankshafts

The crankshafts are of the five main bearing type; the end bearings in the geared motors being single and double

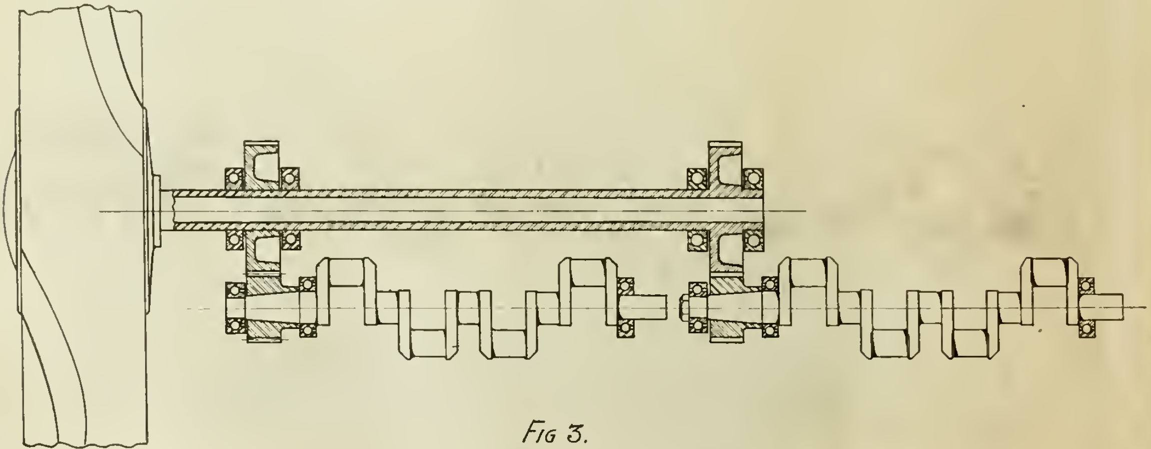


Fig 3.

DIAGRAM OF HISPANO SUIZA 16 CYLINDER PROPELLER SHAFT AND CRANK SHAFTS row ball bearings, the three intermediate bearings being babbitt lined bronze shells.

In the direct type motors only one single row bearing is used at the distribution end of the crankshaft, the use of which considerably reduces the length of the motors. The other bearings are of the plain type.

The average diameter of the main bearings in the motors of the 120 mm. (4.72") series is 58 mm. (2.28") and the crank pins are 50 mm. (1.98") diameter and 64 mm. (2.51") long.

The Distribution

The valves are placed in the top of the cylinder and are arranged in a single line parallel to the axis of the motor.

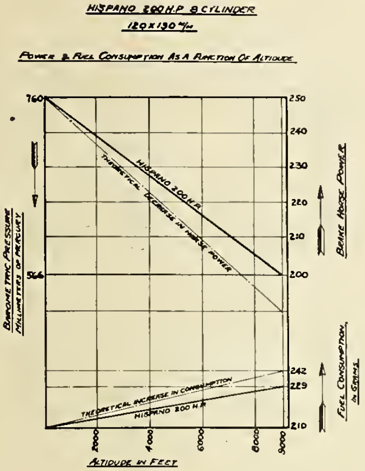


Fig. 8

A single camshaft serves to operate all the valves in each group of cylinders. The camshaft is carried in three bronze bearings, front bearing 40 mm. (1.57"), center bearing 60 mm. (2.36") long, rear bearing 52 mm (2.04") long, all 34 mm. (1.33") in diameter. A 28 mm. (1.10") hole is drilled through the shaft and serves as an oil gallery for the distribution of oil to the bearing surfaces and cam faces. The cam faces are 16 mm. (.629") wide, and are undercut on the back side of the cams.

Each cam acts directly on the valve stem, into the end of which is screwed a case hardened contact plate, which is prevented from turning by means of tandem plate, face keyed to the valve stem and knurled to engage the lower face of the case hardened cam contact plate. Adjustment of the clearance (which is exceedingly large 2 to 3 mm. (.07"-.11") is easily made by means of a special wrench furnished for the purpose.

The camshaft is driven by means of a pair of bevel gears 2.5 module, 15 mm. (.59") face, having a ratio of

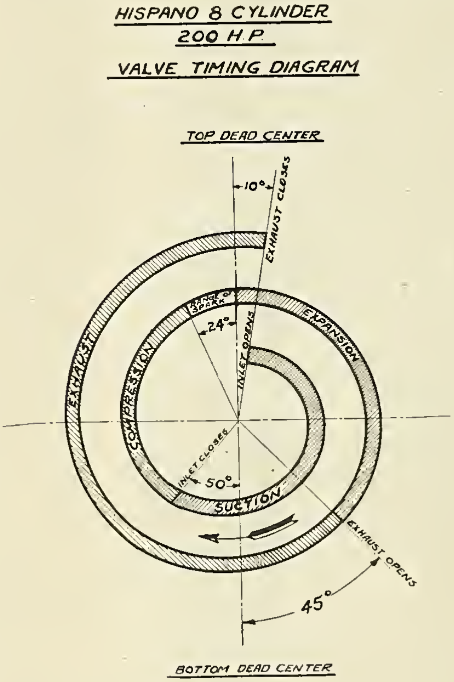
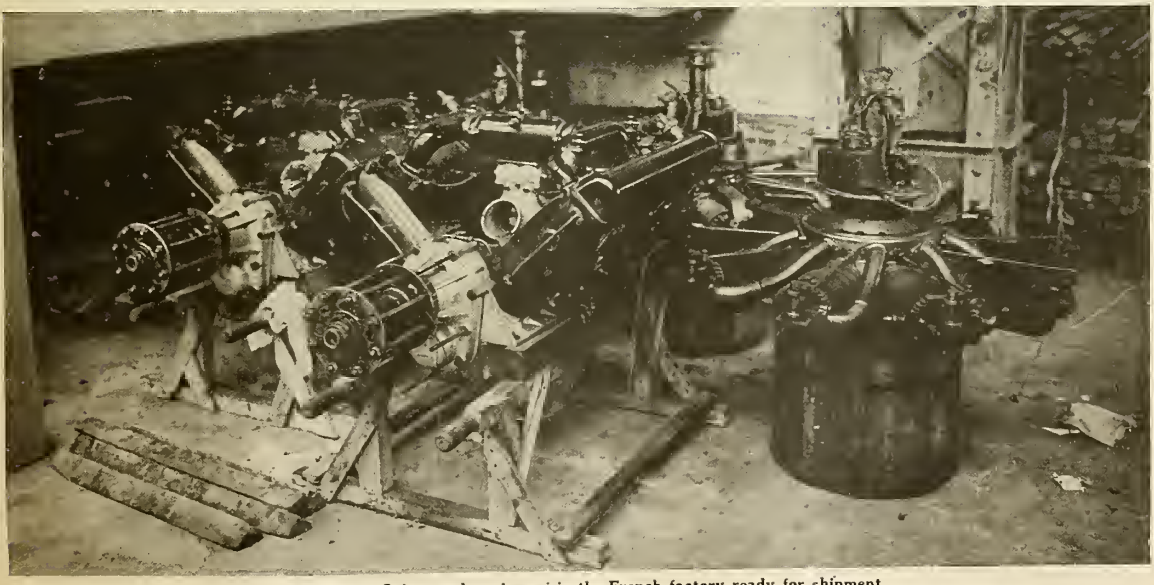


Fig. 9.



Two Hispano-Suizas and an Anzani in the French factory ready for shipment

"THE OPE

Curtiss Achievements

1—The design and construction of the fastest fighting airplane ever flown. Officia
Government records credit this triplane, which was built for the U. S. Nav
known as model 18-T, with 160 miles per hour, carrying full military load, pilo
and passenger. This is 15 miles per hour faster than any speed ever claimed fo
an airplane, a truly epoch-making achievement, made possible by the developmen
of our new model K motor.

2—The design and construction for the Navy of the largest flying boats in the worl
colossal crafts capable of carrying five tons useful load. It was one of these boa
that recently carried fifty passengers.

3—The design and construction for the U. S. Navy of the fastest and most efficie
Seaplane in service anywhere. This craft which is known as the Curtiss model H-
with Liberty motor, made an official speed of 126 miles per hour with full militar
load, armament, ammunition, pilot and passenger.

The Curtiss Engineering Corporation is today the center of aeronautical
Glenn H. Curtiss and his engineers have been busy in drafting rooms, resear
of suitable commercial types. Aircraft especially designed for sportsman's use
workmanship and performance as Curtiss military planes have proved themselv

CURTISS ENGINEERING

Member of M

tiss

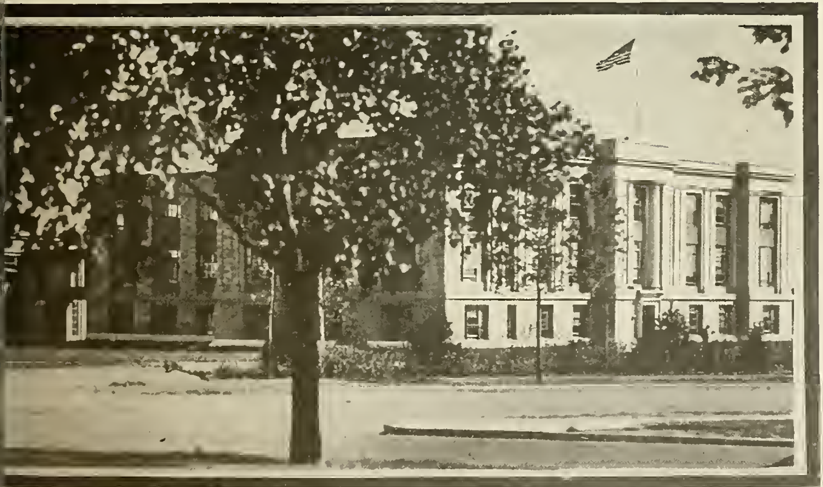
BOOK”

The Great War

development and construction of a 12 cylinder, 400 H.P. motor of an entirely and much lighter type, known as the Curtiss model K-12. These motors have rgone exhaustive tests and are already in production.

development and construction of the Curtiss model K-6, a new and much er 6 cylinder motor. These engines develop 160 H.P. and possess greatest ennce and reliability.

development and construction on a large scale of the Curtiss OXX motors, the J-N-4. training planes, which were used almost exclusively by the United es and Canada and largely in England for the training of American and sh aviators. The training of over seven-tenths of the original land and ne flying pilots, most of whom entered the service and formed the nucleus he United States Training Forces.



ivities instead of being decreased will be increased by the coming of peace. tunnels and shops in perfecting designs and carrying forward the production ther peace-time purposes are already available and are as superior in design,

TION, Garden City, L. I.

ssociation.

15 to 36. The inclined pinion shaft is operated at high speed to reduce the torque.

The arrangement of the accessory drives varies in the different types of motors as will be seen by perusal of the several sectional drawings accompanying this description.

The Crankcase

The aluminum crankcase is cast in two halves split horizontally through the plane of the crankshaft axis. The upper half is a very light shallow casting made possible by the use of short piston stroke and short connecting rods.

It is milled off on either side at angle of 45 degrees from vertical to receive the cylinder blocks.

All of the distribution gearing is of the bevel gear type excepting on the reduction gear motors where the magnetos are driven by a pair of spiral gears mounted in a bracket extending from the forward end of the crankcase.

The lower half of the crankcase carries the lower bearing seats and oil gallery pipes which feed the main crankshaft bearings. This casting is very deep, forming an oil reservoir having a capacity of 10 litres (2.6 gals.) in the eight cylinder 120 mm. (4.72") type.

The two halves of the crankcase are bolted together by means of long, through bolts on either side of the main bearings as well as a series of bolts through the crankcase flanges.

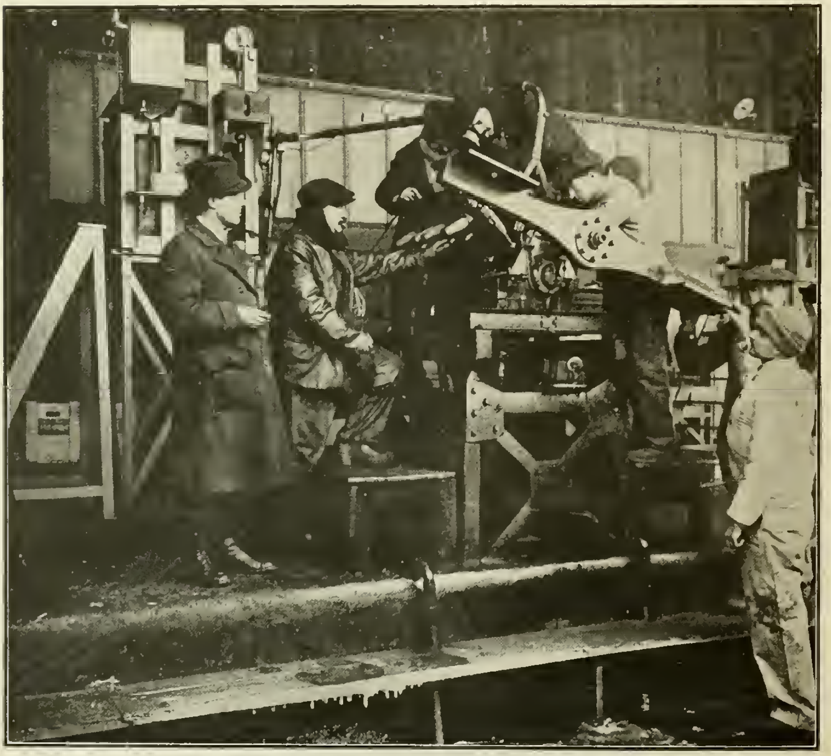
The Valves

The valves are 55 mm. (2.16") head diameter. The port diameter is 51 mm. (2"). The valves stems have two diameters, the lower portion adjoining the head is 10 mm. (.393"), the upper portion or guide portion is 15 mm. (.59") in diameter and is drilled out to take the cam contact plate, which is screwed into the stem. The intake and exhaust valves are made of chrome-tungsten steel and are interchangeable.

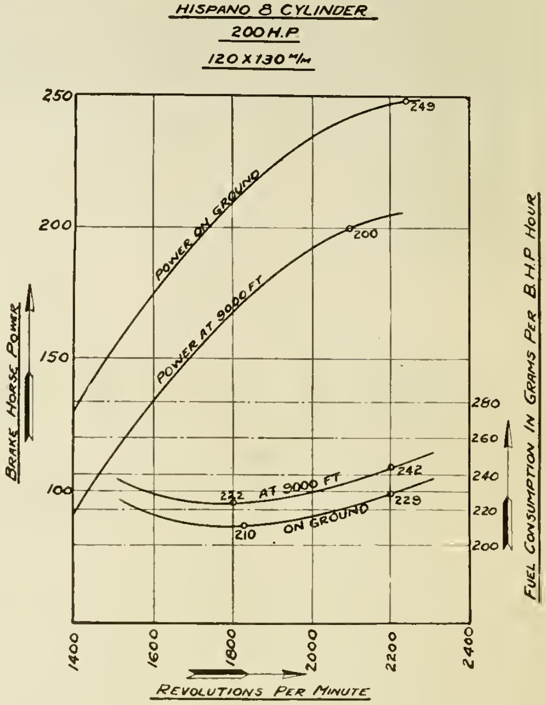
Two concentric helical springs are used to seat the valves; this practice is universal in aviation motors. The valve guides are machined from bronze bars and are screwed into the aluminum cylinder jacket. They are interchangeable with one another.

Air Pumps

A low pressure pump is built into the camshaft housing cover and is operated by one of the cams, to provide pressure on the fuel tanks.



A Hispano-Suiza undergoing block test in France



Tachometer

A tachometer connected is provided on the distribution end of one of the camshafts.

Lubrication

The oil occupation varies according to the type of motor as is indicated in Table 2.

Table 2. Oil Consumption

Type	Litres per hr.	Gals. per hr.
150 H.P.	2	.528
180 H.P.	3	.793
200 H.P.	4	1.057
220 H.P.	5	1.321

The 120 mm. (4.72") bore motors can be operated from two to three hours on the quantity of oil carried in the motor, but it is usual to provide an oil tank and to circulate the oil from the motor through the tank and back to the motor, thus getting the benefit of cooling the oil.

The pressure of the oil pump discharge in 5 kg. per sq. centimeter; the discharge line is 14 x 16 mm.; the suction line is 14 x 16 mm.; the leads to the main branch are 6 x 8 mm. The two leads to the cam shafts are 6 x 8 mm.; the groove around the main bearing bushings is 7 mm. wide and 4 mm. deep. Oil pump operates 1 1/5 motor speed. The reduction gear shaft radial and thrust ball bearings are oiled by the oil which is forced through the reduction gears. This oil also lubricates the ball bearings on the front end of the crank shaft (reduction gear end). The cam shaft bearings, cams and tappets are oiled by oil coming through the hollow camshaft which is under pressure.

Pistons, piston pins and rings are oiled by spray thrown off the crank shaft. The crank pins are oiled by pressure through three holes in each pin;- 5 mm. center hole and a 4 mm. hole on either side of the center. See also size of the holes on the crank thrust, crank bearings and pins.

The distributing gears are oiled by the oil returning from the cam shaft housing to the under pan through the vertical shaft housing.

Oil Supply Tanks

If a tank is placed immediately underneath the motor the oil flows from the crank case into the tank through a 58 x 60 mm. tube. The suction pipe from the tank to the pump should be 14 x 16 mm. The air pipe from the crank case pipe should be 8 x 10 mm.

If the tank is in the top of the plane, the pipe from the drain plug is 20 x 22 mm.; the pipe from tank to pump to oiling points is under 5 kg. pressure and should be 14 x 16 mm.

Ignition

Ignition is provided by two spark plugs per cylinder set to fire synchronously. The current is supplied and distributed by two independent high tension magnetos which are cross-wired to the spark plugs, so that in the event that one unit is put out of operation, the motor will continue to fire on all eight cylinders.

The firing order is given in the diagram Fig. 5.

A hand starting magneto is provided to supply current when starting the motors. The current from this magneto is carried to the high tension distributors on the main operating magnetos and thence to the spark plugs.

Starting

Starting the motor is usually accomplished by swinging the propeller, but in certain cases, a reduction gear hand start is provided which engages the crankshaft at the end opposite the propeller.

Table 6 is a longitudinal section for the 200 and 220 H.P. types of motor, clearly illustrating the hand starting reduction gear and the propeller reduction gear.

Table 3 gives the principal characteristics of the reduction gears used in the 200 and 220 H.P. types.

Table 4 gives the H.P. weight, fuel and oil consumption and compression ratios used in the various types of motors.

The Cooling System

The motor is provided with a single centrifugal water pump having a single inlet and two discharge pipes. The water is led into the bottom of the aluminum jackets and out of the top, in contrast with the German method of pumping water through the top of the jackets only.

The centrifugal water pump has an inlet of 35 mm. in diameter and two discharges of 25 mm. each. Water enters the cylinder blocks at the bottom in the front end and discharges from the rear end at the top. The inlet and outlet holes of the jacket are both 28 mm. in diameter. The water space between the cylinders in the center is 12 mm. The radiator usually has a capacity of 40 L. The pump speed is 1 1/5 times motor speed, and the discharge is about 100 litres (26.5 Gal.) per minute at 1400 R.P.M.

When mounted in a plane, this motor is equipped with a thermostat to govern water temperatures; inlet temperature of 50 degrees centigrade; outlet 65 degrees centigrade; maximum permissible temperature 85 degrees centigrade.

Carburetors

Both Claudel and Zenith carburetors are fitted to Hispano motors, in every case comprising a single hermetically sealed float chamber and two independent mixing chambers into which are fitted various sized choke tubes and jets following the type and size of motor to which they are adapted.

In order to obtain the best possible motor performance, at each altitude the carburetors are equipped with a manually operated barometric control called the altimeter, by the use of which the mixture can be maintained at the best proportions of air to fuel. The actual function is to vary the pressure reigning in the float chamber and so reduce the effective head on the gasoline nozzle.

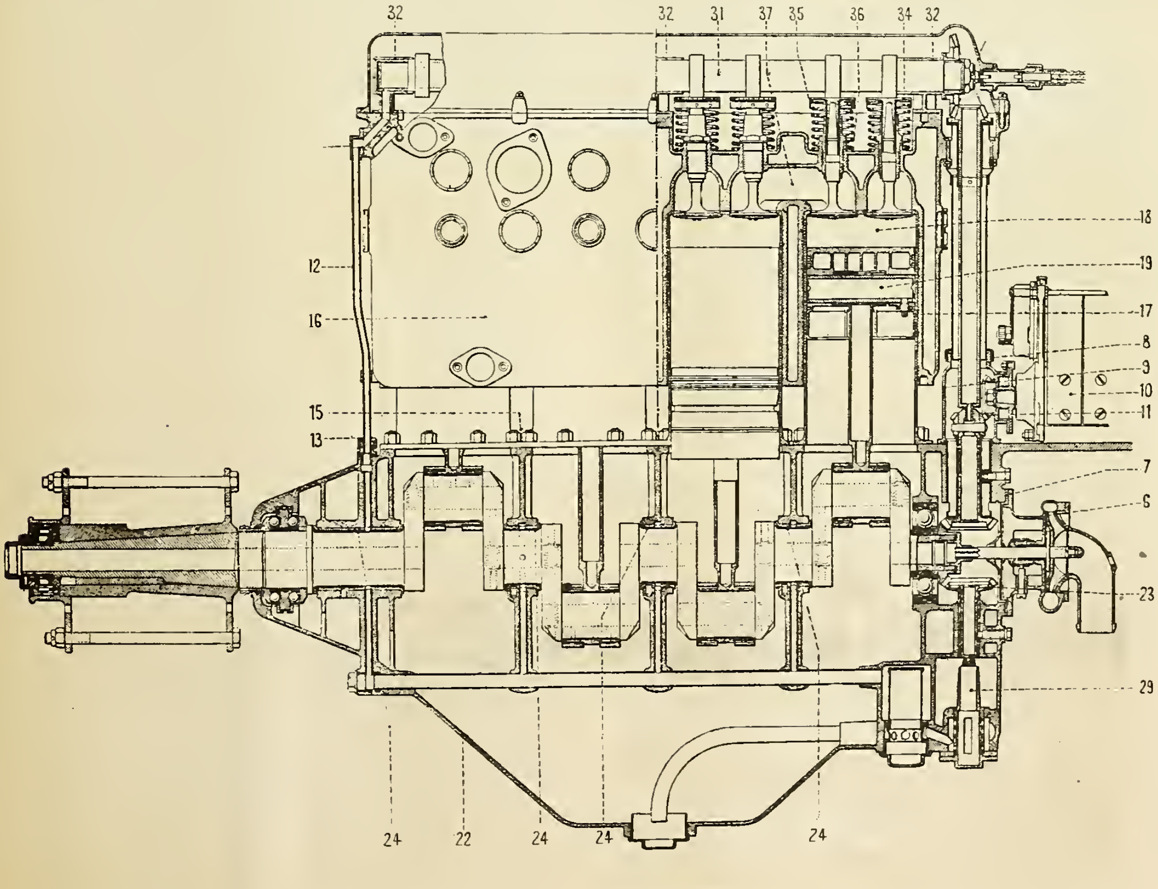


Fig. 10.

REPORT OF THE BUREAU OF AIRCRAFT PRODUCTION

By JOHN D. RYAN, Director

(May 24 to June 30, 1918.)

I.

Creation of the Bureau of Aircraft Production.

Under date of May 20, 1918, by executive order of the President and by General Order No. 51 of the War Department, the Bureau of Aircraft Production was established.

The bureau was described as "an executive agency" which "shall exercise full, complete, and exclusive jurisdiction and control over the production of aeroplanes, aeroplane engines, and aircraft equipment for the use of the Army."

The order provides that such person as shall at the time be chairman of the Aircraft Board shall also be the executive officer of the Bureau of Aircraft Production. He is designated as "Director of Aircraft Production," and the order provides that he shall, under the direction of the Secretary of War, have charge of the activities, personnel, and properties of said bureau.

II.

Aircraft Board.

From the date of the creation of the Aircraft Board by act of Congress approved October 1, 1917, to May 24, 1918, the Aircraft Board acted in an advisory capacity to the Secretary of the Navy and to the Chief Signal Officer of the Army, with respect to the purchase, production, and manufacture of aircraft, and made recommendations as to contracts and their distribution in connection with the foregoing.

The Navy has continued to function in its relations to the Aircraft Board in substantially the same manner as heretofore.

The board acts as a clearing house for information regarding aviation as between the Army and the Navy. The executive order of May 20, 1918, which gave to the Bureau of Aircraft Production the jurisdiction and control of the production of aeroplanes for the Army, recognizes the existence of the Aircraft Board in designating the chairman of that board as head of the Bureau of Aircraft Production, and neither enlarges nor diminishes the duties and functions of the board.

The Aircraft Board consists of the following:

Civilian members.—John D. Ryan, chairman; R. F. Howe, vice-chairman; and W. C. Potter.

Army Members.—Maj. Gen. W. L. Kenly, Col. E. A. Deeds, and Col. R. L. Montgomery. (Last two temporarily relieved.)

Navy members.—Rear Admiral D. W. Taylor, Capt. N. E. Irwin, and Lieut. Commander A. K. Atkins.

III.

Organization of the Bureau of Aircraft Production.

In order to carry out the program and provide the equipment, the bureau is divided into seven main divisions:

(*a*) Executive.
(*b*) Engineering.
(*c*) Production.
(*d*) Spruce Production.
(*e*) Procurement.
(*f*) Finance.
(*g*) Advisory and Consulting.

The Executive Division directs the activities of the bureau.

The Engineering Division is responsible for the design of new models of aeroplanes and engines and all accessory equipment, necessary to meet the military requirements, and when developed to furnish models and drawings to the production department for the producing of quantities called for by the program.

The Production Division is charged with responsibility for the supervision of the production and inspection of all aircraft, including materials and parts therefor, for the investigation and selection of sources of supply, and for the conduct of all relations with contractors, with the exception of the production engineering, the execution of contracts, and matters of financial administration.

The activities of the Production Division are carried on by decentralization through district offices, which are established in various sections of the country where concentrated aircraft production is being carried on. By this means direct contact with the manufacturers is obtained and decisions can be rendered with the least possible delay.

It is of interest to note that aircraft requirements emanate from the Director of Aircraft Production for complete areoplanes, engines, and accessories, and are set forth in an authorized program furnished by the Office of the Secretary of War, which states that certain types of aeroplanes and aeroplane engines in certain monthly quotas of each type are required, these types having previously been determined largely by the Air Forces overseas.

In connection with production, it is of interest to note what has been accomplished:

Aeroplane engine production.

	Total shipments to May 24	Shipments May 24 to June 30, inclusive	Total to June 30, inclusive
Liberty engines:			
Army type	622	994	1,616
Navy type	482	293	775
Total	1,104	1 287	2,319
Foreign combat engines:			
Gnome	179	30	209
Hispano-Suiza 150-horsepower	1,607	581	2,188
Hispano-Suiza 180-horsepower	....	6	6
Hispano-Suiza 300-horsepower	2	....	2
LeRhone 80 horsepower	6	62	68
Total	1,794	679	2,473
Training type:			
Curtiss OX5	4,258	1,216	5,474
Hall-Scott A7a	2,053	130	2,183
Lawrence	66	48	114
Total	6,377	1,394	7,771
Grand total engines	9,275	3,360	12,635

The foregoing figures show shipments from the factory.

In addition to this production, a certain percentage of spares have been included in the shipment of each type of engine.

Combat engines, consisting of the Hispano-Suiza 180 horsepower, and the Liberty 12, are in large quantity production, while the Hispano-Suiza, 300 horsepower, and the Liberty 8 are approaching actual production, and the output of each plant is being pushed to the utmost limit, as it is realized that this country is called upon to supply a large percentage of the requirements of the Allies in addition to equipping planes which are produced in this country. Sufficiently extensive tests of these engines have been made to warrant a feeling of assurance that they will be satisfactory in service.

Battle-plane production.

Total battle-planes produced to May 24, 1918	148
Total battle-planes produced May 24 to June 30, 1918	393

Training planes.

Total training planes produced to May 24, 1918	5,091
Total training planes produced May 24 to June 30, 1918	523

In addition to this shipment of aeroplanes there is a percentage of approximately 80 per cent parts shipped as spares for battle-planes and approximately 100 per cent as spares for training planes.

In order to show in further brief detail what has been accomplished in developing the manufacturing resources of this country in quantity production, a list is given below showing in part orders now placed and quantities shipped first up to May 25th, second up to June 29, 1918:

Articles or Material	Quantity ordered up to—		Quantity freighted up to—	
	May 25	June 29	May 25	June 29
Service planes:				
Observation and day bombing—				
DeH-4	8,000	8,000	155	529
Bristol fighter	2,000	2,000	11	24
Night bombing—				
Handley Page	[1] 500	[1] 500	....	....
Caproui	500	1,000	....	....
Monoplane pursuit SE-5 (Auth)	1,000	1,000	....	....
Service Engines:				
U. S.-12 Army type	20,000	20,000	628	1,615
U. S.-12 Navy type	2,500	2,500	482	775
Bugatti	2 000	2,000	....	....
Hispano 180-horsepower (Auth)	3,000	[2] 3,000	....	....
Hispano 300-horsepower	3,000	3,000	2	2
Elementary training planes:				
Jn-4-D	3 700	3 975	2 837	2,972
SJ-1	1,600	1,600	1,600	1 600
Advanced training planes:				
JN4-H training	402	402	402	402
JN-4-HG and JN6-HG-2	427	517	83	321
JN4-HB and JN6-HB	250	254	16	100
JN6-H observation	100	100	....	....
JN6-H pursuit	125	125	....	....
S-4-B	100	100	100	100
S-4-C	400	400	30	73
Penguin	300	300	36	50
VE-7 (Auth)	1,600	1,600	....	....
Engines:				
Elementary training engines—				
OX-5	7 950	7 950	4 340	5,474
A7a	2,250	2 250	2,054	2,178
Hispano 150-horsepower	3,500	3,500	1,685	2,188
Gnome 100-horsepower	242	242	[3] 177	[3] 209
LeRhone 80-horsepower	2,500	2,500	7	68
Lawrence 28-horsepower	450	450	65	114
Raw materials:				
Mahogany (1,000 feet)	26,409	26,728	2 219	3 257
Walnut (1,000 feet)	3,354	5,093	853	1,123
Spruce (1,000 feet)	107,204	107,204	[4] 17 355	[4] 26,260
Oak (1,000 feet)	281	281	261	281
Birch (1,000 feet)	632	632	561	633
Cherry (1,000 feet)	....	676	....	338
Fir (1,000 feet)	50,234	50 234	[4] 5,926	[4] 8,346
Linen (1,000 yards)	3,187	3,187	2,548	2 863
Cotton (1,000 yards)	15,934	17,476	1 876	2 948
Cotton tape (1,000 yards)	4 256	6 566	2 096	2 359
Acetate dope (1,000 gallons)	204	410	108	234
Propellers (spares):				
Training	30 988	31 312	14,761	19,948
Combat	4,925	6 925	176	1,373

Articles or material	Quantity ordered up to—		Quantity freighted up to—	
	May 25	June 29	May 25	June 29
Instruments and accessories:[6]				
Air pressure gauges	10,000	10 000	4,889	6,273
Air speed indicators	13,500	13,500	1,789	2,115
Altimeters	33,600	43,600	7,996	10,108
Clocks	15,500	20,500	8,484	10,900
Compasses	12,200	12 200	2,145	4,228
Fire extinguishers	11,100	11,100	6,105	7,827
Gunners' safety belts	5,000	5,000	....	309
Map cases	2,500	2,500	....	4
Navigation lights (sets of 3)	....	5,000	....	150
Negative lenses	6,500	6,605	....	1,825
Oil pressure gauges	10,000	10,000	4,965	8,103
Oxygen apparatus	6,000	6,000	88	641
Oxygen helmets	10,000	10,020	....	16
Oxygen tanks	10,000	10,000	44	9,409
Panels (sets of 2)	....	7,500	....	....
Radiator thermometers	12,500	12,500	6,489	7,831
Standard safety belts	4,025	9,525	3,777	4,688
Tachometers	25,000	25 000	10,191	12 433
Voltage regulators	....	2,500	....	....
300-watt generators	....	2,500	....	....
Machine guns:				
Lewis	39 200	39 200	6,081	10,370
Vickers (ground)	12 000	12 000	7,005	8,245
Vickers (aircraft)	(1)	(1)	8	56
Marlin	38,000	38 000	20,744	22,353
Browning	20,000	20,000	....	....
Ordnance accessories:				
Synchronizing devices—				
C. C. interrupter gears	1,250	4,750	604	1,229
C. C. generator	2,500	2,500	....	....
Mechanical interrupter gears	635	635	135	160
Gun mounts:				
Single flexible ring	10,000	15,000	6,530	8'435
Gun sights:				
Ring	13,200	13 200	4,523	7,050
Wind vane	10,499	12,999	4,326	6,849
Unit	8,000	8,000	628	1,323
Auxiliary	11,000	11,000	....	....
Gun yokes:				
Single Lewis	11,000	11,000	....	....
Double Lewis	11 000	11 000	....	....
Duplex trigger control	11,000	11,000	....	....
Single gun stems	9,202	9 202	4,004	4,653
Unit sight brackets	11,000	11,000	....	....
Bombs:				
Incendiary—				
Mark I	112,116	112 116	1	207
Mark II	122,886	122,886	2	8
High capacity drop—				
Mark I	132,000	132 000	....	70
Mark II	70 000	70 000	102	299
Mark III	220,000	220 000	....	432
Mark IV	73,733	73,733	....	....
Mark V	20 988	20 988	....	....
Barlow, heavy	28 000	28 000	12	12
Dummy drop, Mark I	85,000	85,000	8,662	10,008
Bomb accessories:				
Bomb sights—				
Low altitude, Mark I	100	100	100	100
High altitude, Mark I-a	15,000	15,000	135	579
Bomb releases:—				
Mark I	(2)	(2)	(2)	(2)
Mark II	(2)	(2)	(2)	(2)
Mark V	2,420	2,420	1,051	1,051
Mark VIIB (traps only)	100	100	....	100
Barlow, heavy	250	250	19	182
Flares—				
Wing tip	(2)	112,165	....	....
Airplane, Mark I	(2)	50,083	....	....
Flare brackets, holders—				
Wing tip	22,000	22 000	....	....
Airplane, Mark I	(2)	(2)	....	....
Very pistols	22 500	22 500	....	....
Photographic equipment:				
Observation cameras	965	965	491	665
Enlarging lanterns	463	463	463	463
Camera guns	709	1,409	347	358
Unit section equipment	97	97	97	97
Cradles	....	909	....	175
Hangars:				
Steel, 66 by 100	735	735	36	258
Steel, 66 by 140	234	234	202	234
Steel, 100 by 110	315	315	....	90
Canvas	2,500	2,500	1,736	2,160
Balloons:				
Kite, type "R"	1,077	1,102	124	180
Balloon essentials:				
Ferrosilicon (tons)	1,320	1,320	810	954
Caustic soda (tons)	942	942	661	713
Hydrogen cylinders	107,800	107,800	63,350	66,000
Cable (feet)	1,120,200	1,143,390	1,007,292	1,119,492
Winches	53	55	21	23
Balloon equipment (units)	87	87	87	87
Balloon equipment	8	8	8	8
Special clothing:				
Pilots and observers—				
Goggles, Nos. 1, 2 and 3	20,669	20,669	16,349	19,349
Soft helmets and caps	13,976	13,976	13,976	13,976
Special clothing—Continued				
Pilots and observers—Continued				
Hood, French type	13,000	13,000	3,003	9,003
Chin guards, No. 4	7,476	7,476	7,476	7,476
Sweaters, No. 5	10,576	10,576	8,364	9,894
Winter flying suits	13,012	13,012	8,735	10,255
Summer flying suits	1,000	1,000	1,000	1,000
Moccasins, No. 8	16,500	16,500	9,757	14,981
Gauntlets, No. 9	4,603	4,603	1,600	4,588
Gauntlets, No. 10	4,603	4,612	2,200	4,612
Aviator coats	12,327	12,255	12,255	12,255
Face masks	3,003	3,003	3,003	3,003
Antisinking aviator coats	....	825	....	771
Knitted scarfs	12,000	13,000	2,000	6,000
Hard helmets	6,600	6,600	4,500	6,600
Chauffeurs and motorcyclists—				
Goggles, No. 21	16,286	16,286	16,286	16,286
Soft helmets and caps	19,334	19,334	19,334	19,334
Trousers, No. 29	19,286	19,286	16,286	19,286
Gauntlets	50,000	50,000	50,000	50,000
Coats, No. 28	19,286	19,286	16,286	19,286
Flying students—				
Goggles, Nos. 1 and 2	8,195	8,195	5,593	8,195
Hard helmets, Nos. 17 and 18	6,540	6,540	4,040	6,540
Sweaters, No. 5	5,700	5,700	1,500	2,700
Summer flying suits	4,440	6,440	2,190	4,088
Aviator coats	4,743	4,743	4,743	4,743
Construction squadrons—				
Boots, knee	5,025	5,025	3,750	5,025
Boots, hip	5,525	5,525	4,250	5,525
Coats, oil skin	6,750	6,750	6,750	6,750
Trousers	6,750	6,750	6,750	6,750
Hats	6,750	6,750	6,750	6,750
Balloon companies—				
Soft helmets	1,152	1,152	1,152	1,152
Sweaters	1,152	1,152	1,152	1,152
Winter flying suits	1,376	1,376	224	224
Moccasins	1,376	1,376	224	1,376
Face masks	1,152	1,152	1,152	1,152
Leather coats	1,376	1,376	224	1,376
Knitted scarfs	1,152	1,152	1,152	1,152
Leather vests	1,152	1,152	....	....
Leather breeches	1,152	1,152	....	....
Miscellaneous orders—				
Mechanician suits	85,700	85,700	80,103	85,700

(1) Included in above (2) No orders placed

Some idea may be gained from this list of the task of developing and getting into production the various products required by the Air Service, most of them never before having been produced in this country and representing a new art, to develop which both engineers and skilled workmen have to be trained and made proficient.

The manufacturers selected are entitled to the greatest credit for the cooperation and activity they have shown in turning over their existing facilities, and in many cases adding to these facilities in order to meet the requirements.

Recognition is also given to the hearty assistance accorded this bureau by other Government departments.

Special Allied Missions.

A special French Engineering Mission and a special Italian Engineering Mission have been brought to this country and are now engaged in the development of experimental aeroplanes of various types, which will be carefully tested and put into immedate production if satisfactory to the Air Service. The manufacturing facilities of this country are being rapidly developed for the production of complete battle-planes in quantity, and also for the production of finished parts, which will be sent overseas for assembly.

IV.

Spruce Production Division.

The output of spruce on the Western Coast is being rapidly increased, and in order to give an intelligent picture of the methods used in bringing about these results, the following figures on output are of particular interest:

Spruce.

	Feet
Total spruce shipped up to May 24, 1918	56,711,044
Total spruce shipped May 24 to June 30	8,413,542
Grand total spruce shipped	65,124,586

Fir.

Total fir shipped to May 24, 1918	19,216,012
Total fir shipped May 24 to June 30	6,181,737
Grand total fir shipped	25,397,749

Of the total shipments of spruce, 2,530,824 feet were shipped direct to England from the southern district.

Of the total fir shipped, 7,055 feet consisted of wing beams completely finished.

SPRUCE PRODUCTION PERSONNEL.

	On May 24	One June 30
Commissioned personnel	459	538
Enlisted personnel	12,382	17,697
Civilian personnel	71	70
Total	12,912	18,305

SPRUCE PRODUCTION CUT-UP PLANT.

In addition to the activities of the Spruce Production Division in getting spruce through regular lumber camp channels, a cut-up plant has been located on a government reservation at Vancouver, Wash. Work on this cut-up plant was begun December 24, 1917, and completed February 7, 1918.

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[1] Program is for 1,000.
[2] 1,000 ordered, 2,000 additional authorized but not ordered.
[3] Includes 46 from the Navy.
[4] Balloon fabric and airplane fabric.
[5] These figures taken from inspection returns.
[6] Does not include quantities shipped to allies.

The inception of the idea of a cut-up plant to supplement the sawmills was due chiefly to the necessity of manufacturing rived cants by those not having saw mills. The cut-up plant is now being used for the manufacture of aeroplane lumber from the entire log.

Machinery of the most modern type has been secured and scientific methods of manufacturing air craft material adopted. Circular head saws are being used in four of the six units of the mill, and hand saws in the other two.

The logs and rived cants are shipped to the plant and are handled by the band saws, and the other units take the flitches from the sawmills in the woods. It is estimated that the cut at the mill can be run up to 9,000,000 feet per month.

In this plant the logs are cut to dimensions, which does away with the waste incident to transporting lumber across the country.

DRY KILN.

A dry-kiln plant of the Tidman pattern has been erected adjacent to the cut-up plant. The tremendous amount of material lost through checking in transportation and improper kiln-drying methods has been done away with by the installation of this plant. It is estimated that the saving in freight will pay for the erection of this plant within twelve months.

The plant consists of twenty-four modern kilns, each having a charge capacity of about 30,000 feet. The time of drying depends upon the size and condition of the wood, averaging form 12 to 30 days. The output of the dry-kiln plant averages 40,000 feet daily.

V.

FINANCES.

Total appropriations, obligations, and disbursements as of May 31 and June 30, 1918, for all aviation purposes and not confined to production:

Appropriations.

Increase for aviation, Signal Corps, 1918	$640,000,000.00
Signal Service of the Army, 1917-18, Aeronautics Act June 15, 1917	31,846,067.16
Signal Service of the Army, 1918, Aeronautics Act May 12, 1917	10,800,000.00
Total	$682,646,067.16

	To May 31, 1918	June 1 to June 30, 1918	Total to June 30, 1918
OBLIGATIONS			
Airplanes and spare parts	$195,193,636.18	$22,401,604.97	$217,595,241.15
Engines and spare parts	249,188,596.81	4,967,050.40	254,155,647.21
Balloons and accessories	11,071,431.52	274,249.28	11,345,680.80
General equipment	79,048,280.52	2,458,740.82	81,507,021.34
Acquisition of plants	2,595,599.83	....	2,595,599.83
Experimental and research	2,973,817.20	264,810.99	3,238,628.19
Total	540,071,362.06	30,366,456.46	570,437,818.52
Construction of buildings and flying fields, including purchase and lease of land, United States and abroad	68,956,838.35	2,961,061.64	71,917,899 99
Training, operation, and maintenance	92,358,991 33	17,035,930.40	109,394,921.73
Total	161,315,829.68	19,996,992.04	181,312,821.72
Grand total	701,387,191.74	50,363,448.50	751,750,640.24
CASH DISBURSEMENTS			
Airplanes and spare parts	76,257,253.08	7,464,198.94	83,721,452.02
Engines and spare parts	69,520,425.62	8,169,015.43	77,689,441.05
Balloon and accessories	1,718,082.71	422,397.47	2,140,480.18
General equipment	35,498,567.20	6,718,528.52	42,217,095.72
Acquisition of plants	1,036,952.54	....	1,036,952.54
Experimental and research	1,261,094 24	353,378 78	1,614,473.02
Total	185,292,375.39	23,127,519.14	208,419,894.53
Construction of buildings and flying fields, including purchase and lease of land, United States and abroad	57,642,578.62	4,666,352.26	62,308,930.88
Training, operation, and maintenance	82,335,163.18	20,254,400.05	102,589,563.23
Total	139,977,741.80	24,920,752.31	164,898,494.11
Grand total	325,270,117.19	48,048,271.45	373,318,388.64

It is of particular interest to note that there has been disbursed in cash up to June 30 a total of $208,419,894, covered by Air Service material, and a total of $164,898,494 for buildings, flying fields, training, and maintenance. Of this amount there have been cash disbursements of approximately $1,000,000 for experimental work on engines and planes at the McCook Experimental Field, Dayton, Ohio, and a cash disbursement of approximately $350,000 up to June 30 for special gas at the Fort Worth, Tex., Experimental Plant. In addition to this, there has been a total expenditure of approximately $200,000 in completing the development of the present battle planes so as to take advantage of American manufacturing methods and quantity production.

VI.

PERSONNEL.

One of the most difficult problems which continually faces the director of this bureau is the securing of the proper personnel to carry on the activities of this very specialized industry, about which so little was known in this country at the time war was declared. With the other activities of the Government, the problem grows more serious each day.

In order to convey an idea of what this problem is, a detailed set of statistics is given showing the enlisted, commissioned, and civilian personnel—first, in Washington, and, second, in the district offices or plants where aircraft is being produced.

Personnel in Washington (excluding Spruce Production Division).

RANK OR STATUS	May 24, 1918		June 30, 1918	
	Men	Women	Men	Women
COMMISSIONED				
Colonels	1	....	2	....
Lieutenant colonels	4	....	5	....
Majors	16	....	18	....
Captains	66	....	73	....
First lieutenants	111	....	101	....
Second lieutenants	116	....	129	....
Total commissioned	314	....	319	....
CIVILIAN				
Executives	21	....	24	....
Volunteers	9	....	8	....
Production experts	238	....	187	62
A. M. engineers	74	....	76	....
Inspectors, A. and A. E.	97	....	86	....
Expert cost accountants	14	....	18	....
Stenographers	82	248	51	300
Typists	45	135	48	141
Clerks	133	270	144	290
Catalogue and index clerks	....	55	....	62
Laborers	30	....	31	....
Messengers	117	59	150	23
Watchmen	61	....	56	....
Charwomen	....	68	....	69
Telephone operators	....	19	....	20
Elevator operators	6	....	6	....
Miscellaneous	107	7	140	7
Total civilians	1,034	861	1,025	974
Combined totals	1,895		1,999	
Grand total	2,209		2,318	

NOTE:—No master signal electricians, sergeants, corporals or privates were assigned.

Personnel outside of Washington (excluding Spruce Production Division).

RANK OR STATUS	May 24 1918	June 29 1918
COMMISSIONED		
Colonels	1	1
Lieutenant colonels	4	1
Majors	11	6
Captains	65	29
First lieutenants	149	127
Second lieutenants	125	130
Total commissioned	355	294
CIVILIAN		
Executives	1	....
Volunteers	....	....
Production experts	124	128
A. M. engineers	97	154
Inspectors, A. and A. E.	2,260	2,367
Expert cost accountants	57	84
Stenographers	114	130
Typists	4	6
Clerks	133	133
Catalogue and index clerks	....	....
Laborers	1	2
Messengers	35	34
Watchmen	1	....
Charwomen	....	....
Telephone operators	7	8
Elevator operators	....	....
Miscellaneous	78	130
Total, civilians	2,912	3,176
Grand total	3,267	3 470

NOTE:—Prior to Aug. 1, 1918, all enlisted men were of the Division of Military Aeronautics detailed for special duty in the bureau. They comprised master signal electricians; sergeants, first class; sergeants; chauffeurs, first class; chauffeurs; corporals; cooks; privates, first class; privates.

NAVAL and MILITARY AERONAUTICS

Key to Abbreviations

AAD—Assigned to active duty.
ABC—Report to Army Balloon School, Arcadia, Cal.
ABC—Report to Army Balloon School, Arcadia, Cal.
ADO—Report to Aviation Supply Depot, Dayton, Ohio.
ADT—Report to Aviation Supply Depot, Dallas, Texas.
AFO—Report to Aviation Supply Depot, Fairfield, O.
AGC—Report to Aviation Supply Depot, Garden City, L. I., N. Y.
AHT—Report to Aerial Gunnery School, Houston, Texas.
AIR—Transferred to the Air Service, National Army, without change in rank or date of commission.
ALF—Report to Camp Alfred Vail, Little Silver, N. J.
AMV—Report to Aviation General Supply Depot, Morrison, Va.
AOV—Report to School for Aerial Observers, Hampton, Va.
APR—Report to School of Aerial Photography, Rochester, N. Y.
ARV—Report to Aviation Supply Depot, Richmond, Va.
ASM—Report to Aviation Mechanics' Training School, St. Paul, Minn.
BFT—Report to Barron Field, Fort Worth, Texas.
BRN—Report to Bakers Field, Rochester, N. Y.
BST—Report to Brooks Field, San Antonio, Tex.
CAF—Report to Carlstrom Field, Arcadia, Fla.
CAP—Commissioned as Captain, Aviation Section, Signal Corps.
CDT—Report to Aviation Concentration Camp, Dallas, Texas.
CFT—Report to Carruthers Field, Fort Worth, Texas.
CGC—Report to Aviation Concentration Camp, Garden City, L. I., N. Y.
CGS—Report to Aviation Concentration Camp, Greenville, S. C.
CIT—Report to Radio School, Carnegie Institute of Technology, Pittsburgh, Pa.
CJS—Report to Camp Jackson, Columbia, S. C.
CJW—Report to Camp John Wise, San Antonio, Texas.
CLR—Commissioned as Colonel, Aviation Section, Signal Reserve Corps.
CMV—Report to Aviation Concentration Camp, Morrison, Va.
CPA—Commissioned as Captain Air Service, National Army.
CPR—Commissioned as Captain, Aviation Section, Signal Reserve Corps.
CRI—Report to Chanute Field, Rantoul, Ill.
CSO—Report to the Chief Signal Officer, Washington, D. C.
CUI—Report to School of Military Aeronautics, Cornell University, Ithaca, N. Y.
CWT—Report to Call Field, Wichita Falls, Texas
DAF—Report to Dorr Field, Arcadia, Fla.
DAP—Report to Director of Aircraft Production, Washington, D. C.
DIK—Report to Camp Dick, Dallas, Tex.
DIS—Honorably discharged from service.
DMA—Report to Director of MilitaryAeronautics, Washington, D. C.
ELA—Report to Eberts Field, Loanoke, Ark.
EOT—Report to Ellington Field, Olcott, Texas.
FLA—Commissioned as First Lieutenant Air Service, National Army.
FLR—Commissioned as First Lieutenant, Aviation Section, Signal Reserve Corps.
FLT—Commissioned as First Lieutenant, Aviation Section, Signal Corps.
FOB—Report to Fort Omaha Balloon School, Omaha, Neb.
FRF—On duty requiring regular and frequent aerial flights.
FSO—Report to Fort Sill School for Aerial Observers, Fort Sill, Okla.
GIT—Report to School of Military Aeronautics, Georgia Institute of Technology, Augusta, Ga.
GLC—Report to Gerstner Field, Lake Charles, La.
HHN—Report to Hazelhurst Field, Mineola, L. I., N. Y.
JMA—Rated as Junior Military Aviator.
JRC—Report to Jackson Field, Riverside, Cal.
KST—Report to Kelly Field, So. San Antonio, Tex. (When specified in the order, the number of the field is given in parentheses)
LDT—Report to Love Field, Dallas, Tex.
LHV—Report to Langley Field, Hampton, Va.
MAC—Report to March Field, Allesandro, Cal.
MAJ—Commissioned as Major, Aviation Section, Signal Corps.
MAT—Report to Mather Field, Sacramento, Cal.
MDO—Report to McCook Field, Dayton, Ohio.
MIA—Report to U. S. Naval Air Station, Miami, Fla.
MIT—Report to School of Military Aeronautics, Massachusetts Institute of Technology, Boston, Mass.
MJA—Commissioned as Major Air Service, National Army.
MJR—Commissioned as Major, Aviation Section, Signal Reserve Corps.
MSC—Report to Radio School, Maryland State Agricultural College, College Park, Md.
OBS—Attached to the Aeronautical Service as Observers.
OSU—Report to School of Military Aeronautics, Ohio State University, Columbus, Ohio.
PFO—Report to Post Field, Fort Sill, Okla.
PMT—Report to Park Field, Millington, Tenn.
PUP—Report to School of Military Aeronautics, Princeton University, Princeton, N. J.
PWM—Report to Payne Field, West Point, Miss.
REL—Relieved from present duty.
RSD—Report to Rockwell Field, San Diego, Cal.
RTR—Retransferred to organization attached to previous assignment to aviation duty.
RWT—Report to Rich Field, Waco, Tex.
SBI—Report to Scott Field, Belleville, Ill.
SAG—Report to Souther Field, Americus, Ga
SGS—Report to Camp Sevier, Greenville, S. C.
SLA—Commissioned as Second Lieutenant Air Service, National Army.
SLR—Commissioned as Second Lieutenant, Aviation Section, Signal Reserve Corps.
SLT—Commissioned as Second Lieutenant, Aviation Section, Signal Corps.
SMA—Report to School of Military Aeronautics, Cambridge, Mass.
SMM—Report to Selfridge Field, Mount Clemens, Mich.
SRC—Report to Columbia School for Radio Officers, New York City.
TFT—Report to Taliaferro Field, Fort Worth, Texas. (When specified in the order, the number of the field is given in parentheses)
TMA—Report to Taylor Field, Montgomery, Ala.
UCB—Report to School of Military Aeronautics, University of California, Berkeley, Cal.
UIU—Report to School of Military Aeronautics, University of Illinois, Urbana, Ill.
UTA—Report to School of Military Aeronautics, University of Texas, Austin, Tex.
VBW—Report to Vancouver Barracks, Washington.
WAC—Report to Aviation Concentration Camp, Waco, Tex.
WCS—Wire to the Chief Signal Officer upon arrival.
WDM—Wire, Director of Military Aeronautics, upon arrival.
WFO—Report to Wilbur Wright Field, Fairfield, Ohio.

Notes

Note 1—Report to places mentioned in order named for temporary duty.

Note 2—Report to Air Service Headquarters, Fayetteville, N. C.

Note 3—Report to Air Service, Detroit, Mich., to the officer in charge.

Note 4—Report to Honolulu, T. H., to the Hawaiian Dept. for duty with the 6th Aero Squadron.

Note 5—Report to Aberdeen, Md., to Commanding Officer of the 271st Aero Squadron.

Note 6—Report to Chief of Tech. Sectio Dayton, Ohio.

Note 7—Report to Dist. Mgr. Aircraft Prod., Dayton, Ohio.

Note 8—Report to Bureau of Aircraft Prod., Air Building, Dayton, Ohio.

Note 9—Report to Students' Army Training Corps., Boston, Mass.

Note 10—Report to Commerce Building, Houston, Texas.

Note 11—Report to Chamber of Commerce Building, Indianapolis, Ind.

Note 12—Report to Air Training Radio Warehouse, Houston, Texas.

Note 13—Report to Aircraft Acceptance Park, Elizabeth, N. J., and wire DAP.

Note 14—Report to Emerson Field, Camp Jackson, Columbia, S. C.

Note 15—Report to Dist. Mgr. Aircraft Finance, 360 Madison Ave., N. Y. C.

Special Orders Nos. 270 to 279 Inc.

Mc

McClelland, Harold M.	LDT
McAuliffe, Roland Joseph	SLA; RWT
McCullough, Charles B.	HHN
McCabe, Harold Annis	SLA; AAD
McMath, Robert R.	DMA
McDanel, Wilson F.	TFT
McCaffrey, Harold W.	AGC
McLaughlin, John E.	TFT
MacRae, Nelson	DMA
McGranahan, Joseph Francis	SLA; EOT
McCue, John B.	CAF
McPike, George V.	ELA
MacMichael, John H., Jr.	TFT
McCarron, Henry A.	CAF
McLaughlin, William Patrick, Jr.	ABC
McGregor, Kenneth C.	CFT
McNulty, William Gerard	FLA
McFarland, Brigham Wheeler	RWT
McCabe, George M.	EOT
McGinty, Leonard G.	KST
McAleeuan, Arthur	AGC
McCarthy, Carl Daniel	CJW

N

Norris, George L.	DAP
Newbold, Edwin E.	AGC
Netcher, Charles	CGC
Naughton, Thomas J.	DMA
Newbury, Frank J.	EOT
Neighbors, Sidney	Note 13
Norton, Dudley S.	Note 6

O

Olmstead, Robert S.	DMA
O'Neil, Arthur Jeremiah	SLA; EOT
Otto, Thomas Osgood	Note 11
Owens, Leo E.	HHN
Overlees, Milor Haskell	SLA; KST
O'Donnell, William M.	FLA
Olson, Norman O.	LDT
O'Brien, Edward Thomas	RSD
Oweey, Walter Bradley	SLA; ELA
Olds, James H. S.	HHN
O'Connor, James E.	RSD
Oberrender, Graaf R.	BST
O'Connell, Jack J.	TFT

P

Peterson, David McK.	CAF
Porter, H. E.	CAP
Prior, Roger W.	MIT
Palmer, Charles A.	RSD
Prentiss, Paul H.	CAF
Pennefather, James S.	Note 15
Pickett, Roy W.	CGC
Pfau, George H.	DMA
Palmer, Sumner C., Jr.	HHN
Penfield, Charles C.	KST
Pettle, Vincent F.	AGC
Pratt, Clifford V.	ABC
Parish, Cheaney L.	Note 14
Parrish, Isaac N.	KST
Parmelee, Charles R.	LDT
Panzer, Carl H.	AGC
Pierce, Hugh M.	PFO
Pawson, James M.	TFT
Phinney, Burton V.	TFT
Pillsbury, William G.	TFT
Prince, Earl P.	TFT
Powers, Myron	SLA; TMA
Plummer, David Clarence, Jr.	TMA

Patterson, Owen H.	BST
Peterson, Elrey G. E.	CJW
Palmer, Milwood J.	FRF
Phillips, Wendell	TFT
Peace, Harley M.	RWT
Pinneo, Ormond Louis	SLA; SAG
Percy, Le Roy P.	ELA
Poole, Albion W.	LDT

R

Riedal, George D.	DMA
Reed, Harold B.	ABC
Reed, Paul S.	LHV
Russell, Clinton W.	KST
Replogle, Ferel O.	DAP
Richardson, Elmer C.	RWT
Robie, Frederick	TFT
Robinson, Gwynn	AMV
Ramsey, John R.	EOT
Rollins, Joseph R.	DMA
Reel, Herbert W.	UTA
Ray, Martin H.	DMA
Roberts. George Downing	SLA: MAC
Robb, Louis	KST
Ryan, Asa W.	RSD
Rayburn, Allan B.	LDT
Rady, William J.	AGC
Rogers, Harry S.	RWT
Ruby, Orville W.	RSD
Rixford, Halsey L.	LHV
Reardon, Charles S.	ELA
Rice, Samuel W.	BST
Rose, Elmer J.	HHN
Riley, William Edward	ABC
Robinson, Adrian A.	LDT
Rieder, Louis C.	SLA
Randall, Norman L.	AGC
Riherd, Maurice B.	RSD
Ramsdell, Glenn L.	LDT
Reid, James D.	PWM
Rowe, Maurice B., Jr.	TFT
Roe, James A., Jr.	GLC
Rooney, Francis L.	PFO
Robie, Frederick	TFT
Richards, Harrison H. C.	HHN
Reinhard, Henry A.	CGC
Reid, William H. E.	TFT
Reynolds, George Edwin	TMA
Rogers, Gardiner M.	UTA
Rutledge, Irwin B.	TFT
Rothstein, Arthur	TFT
Rinker, Harry M.	GLC
Rieder, Louis C.	TFT
Roberts, Hamilton H.	CGC
Reimann, Benjamin C.	AGC
Richard, William E.	LDT
Russell, Arthur C.	ELA
Richman, G. Raymond	PFO
Rankin, John W.	KST
Riley, William Edward	ABC
Regan, Paul T.	PFO
Riley, Howard W.	PWM
Reddy, Phillip J.	KST

S

Smith, Clarence A.	DMA
Scully, William Augustine	DAP
Stevenson, Arthur William	HHN
Sanders, Lewis R.	LHV
Schultz, Lloyd G.	RSD
Schank, Harry E.	AGC
Spiner, Louis H.	FRF
Stormes, Herbert A.	LHV
Simon, Gerald H.	CGC
Smith, Harold Worden	SLA; CWT
Schenk, Lawrence	DMA
Swope, Philip Williams	SLA; KST
Seitz, George H.	AGC
Sholts, Forrest H.	EOT
Sparrow, Carroll M.	DAP
Smith, Fred Lester	KST
Smith, Carl M.	MIT
Simons, John W., Jr.	PMT; DMA: Note 1
Shellstrom, F. C.	FRF
Spink, Ernest William	SLA: PMT
Scanlan, Francis H.	RSD
Swiler, Carlton P.	PWM
Schenck, Ralph Eugene	AGC
Sidenberg, George Monroe	SLA; KST
Smedley, Harry Simms	SLA: KST
Simon, Harry Edward	SLA: SAG
Shuman, William Darlington Mullin	SLA
Showalter, Roy R.	CGC
Swathern, Fred A.	KST
Steele, James McKinley	RSD
Steele, Dudley M.	CAP
Stollenwerck, Edward Carroll	WFO
Schemerhorn. Maurice T.	LHV
Sherwood, Horace M.	TMA
Shaw, Burton Alfred	CFT
Sullivan, Matthew M.	KST
Schoaf, Ralph F.	HHN
Shadow, Willis A.	PFO
Shangraw, Clayton C.	SRC
Sampson, Edward W.	UTA
Smith, Franklin	RSD

T

Tucker, Morris Langdon	SLA; PWM
Taylor, Wilberforce	SLA; SAG
Tracy, Shelley E.	CRI
Tower, Roderick	DMA
Tobelman, Gustave Henry	SLA; KST
Teague, Earl A.	LHV
True, Leland G.	AGC
Taylor, William A.	DMA
Thomas, Hayward C.	KST
Towers, Edward J.	CJW
Thompson, Alexander C., Jr.	CGC
Thompson, Alexander Raymond	SLA: CFT
Thompson, Paul E.	BFT
Taylor, Newell E.	SAG
Townsend, Ervin N.	TFT
Talbot, Clarence P.	TFT
Thompson, Wilher S.	TFT
Throneberg, Otto	AGC

Cadet J. W. Warshauer, a New Yorker, who joined the Canadian Air Force when recruiting for the U. S. Air Service was closed

V

Vaughan, Charles Curry	SLA: CFT
Volk, Charles F.	FRF
Vaughan, Raymond E.	DMA
Valentine, Everett Milton	SLA; CFT
Vernon, John S.	LHV
Vickery, Merritt A.	GLC
Valentine, Louis A.	TFT

W

Waldo, Herbert S.	AGC
Wiles, Richard E.	RSD
Wells, Frank W.	FRF
Whiting, Frank S.	E .T
Wasson, Clarence Jackson	SLA; KST
Waples, Glenn Cecil	SLA; KST
Williams, Philip	SLA; KST
Wilson, Floyd Charles	SLA; KST
Wheaton, Sidney Levi	SLA; EOT
Woodward. Mark R.	FRF
Wheeler, Harry C.	RSD
Walburg, Harry E.	AGC
Walter, Frank H.	CJW
Wright, Ray E.	CJW
Wright, Frank W.	RSD
Worthington, James R.	FRF
Walsh, Raycroft	MJA
Wood, Edward H.	FRF
Waterhouse, Frederick B.	RSD
Worsham, George Atkinson	SLA: EOT
Webster, David L.	LHV; DAP; Note 1
Williams, Charles H.	UTA
Wiles, Richard E.	DAP
Welty, James A.	AGC
West, Conrad R.	AGC
Wieman, Henry K.	CJW
Walker, Kenneth N.	BST
West, Stewart N.	BST
Williams, Herbert Edward	SLA; EOT
White, Charles D.	ELA
Wright, George O.	BST
Woolen, Clyde L.	RSD
Winslow, Julian E.	DAF
Warner, James William, Jr.	SLA; KST
Williams, Victor Elza	SLA; KST
Williamson, Joseph R.	CJW
Werneth, Louis S.	LHV
Wentworth, Will	PFO
White, Asmon D.	PFO
Woods, Clyde	TFT
Wuertenbaecher, Henry E.	RSD
Wilson, Maurice W.	TFT
Warner, Brady W.	DMA
Whiting, Frank R.	LHV
Wyman, George W.	KST
Waterman, Sherwood L.	HHN
Waite, Herbert E.	FRF
Wright, George Osgood	CFT
Kranz, Irwin B.	TFT
Wakefield, Robert B.	KST

Y

Yount, Barton K.	DMA
Young, Ernest E.	PFO
Young, Leslie B.	PMT
Young, Alsie McKinley	SBI
Young, Daniel J.	ELA

Z

Zuckerman, Stanley	RSD
Zipp, Homer D.	BST
Zacher, Edwin F.	RWT
Zimmerman, John* E.	PWM
Zipf, Oscar R.	AGC

Notes

Note 1—Report to places mentioned in the order named for temporary duty.

Note 2—Report to Dist. Mgr. of Aircraft Finance, Dayton, Ohio, and by wire to DAP, Washington.

Note 3—Report to Dist. Mgr. Aircraft Production, Dayton, Ohio, and wire DAP, Washington.

Note 4—Report to Aberdeen, Md., to commanding officer 271st Aero Squadron.

Note 5—Report to Detroit, Mich., to commanding officer Aircraft Production.

Note 6—Report to Canal Zone, Panama, France Field, Coco Walk.

Note 7—Report to Dayton, Ohio, to Chief of the Areoplane Eng. Dept. and wire DAP, Washington.

Note 8—Report to Middletown, Pa., and report to commanding officer officer.

Note 9—Report to Syracuse, N. Y., to the H. H. Franklin Company as plant property officer and wire DAP, Washington.

Note 10—Report to Goodman Field, Stithton, Ky., for duty.

Special Orders Nos. 280 to 288, Inclusive

A

Allen, Edmund T.	NOTE; 6
Anderson, Edward M.	CWT
Adams, Harold V.	PMT
Aney, Melvil C.	HHN
Alley,, Gerard Francis	SLA; BFT
Allen, Truman W.	HHN
Ainsworth, Frank W.	ELA
Almy, John Hull	ABC
Anderson, Milton S.	EOT
Aikin, Thomas B.	CAF
Allen, Thomas B.	PMT
Abbott, Henry F.	HHN
Alvey, Paul	HHN
Austin, Joseph Hubert	SLA; CRI
Alexander, James Franklin	DAP
Abbott, Leo James	EOT
Anderson, Charles	SLA; MAC
Amundson, George	SLA; MAC
Anglin, Charles H.	DMA

B

Buedinger, William Anton	SLA; CFT
Balkema, Bert B.	DAP
Blake, Wilton McKay	TFT
Beck, Edward S.	PFO
Binion, Clay	SLA
Burgess, George H.	EOT
Brelin, Hilding Gustav	SLA; MAT
Baldwin, Robert C.	DMA
Burmeister, John Carl	SLA; RWT
Blouke, Pierre	EOT
Barry, Lawrence Elmer	SLA; SBI
Bufkin, Wesley F.	PMT
Bigelow, James L.	HHN
Beckman, Fred Herman	SLA; BFT
Butterworth, Russell I.	HHN
Battles, Winthrop H.	HHN
Barker, John De Forrest	HHN
Blevins, B. B.	TMA
Baer, William Sidney	EOT
Bishop, Edward P.	CAF
Barker, Stephen R.	CAF
Blair, Winfrey Dyer	EOT
Bradley, Walter Thomas	SLA; EOT
Bentley, Frank H	HHN
Butler, William E.	HHN
Barr, Eugene O.	HHN
Bettainier, Leo Claudy	SLA; MAT
Brown, Raymond J.	HHN
Bruner, William D.	TFT
Black, Charles N.	LDT
Brown, Sidney F.	CFT
Boucher, Clarence K.	HHN
Burns, John R.	HHN
Bufkin, Wesley F.	PMT
Bacon, Guy Clarence	SBI
Bishop Edward P.	CAF
Barker, Stephen R.	CAF
Benton, James Thomas	SLA; MAT
Blackburn, Jack	HHN
Bigelow, Joseph Smith	FOB
Boyd, James Francis	RWT
Budinger, William Anton	RWT
Burnight, Ernest R.	DMA
Brooks, Frederick H	DMA
Blanchard. Leslie D.	EOT
Pragg, Caleb S.	NOTE; 7
Baldwil, Ernest Robert	Note; 5
Banks, Frank	NOTE: 7
Brock, Henry I.	DMA
Boynton, Willard Henry	SLA; SBI
Barlow, Leonard Maas	SLA; BFT
Barnes, Robert Haywood	SLA; KST
Bird, Lee Wilson	SLA; CFT

(Continued from page 776)

Report of Personnel Department, Bureau of Aircraft Production, Washington (excluding Spruce Production Division), as of June 30, 1918.

RANK OR STATUS	Executive	Engineering	Production	Procurement	Finance	Advisory	Spruce	Total
COMMISSIONED								
Colonels	2	.....	.....	.....	.....	.....	.....	2
Lieutenant colonels	2	1	1	.....	1	.....	.....	5
Majors	1	1	11	2	2	1	.....	18
Captains	9	5	36	11	10	1	1	73
First lieutenants	17	5	44	14	21	.....	.....	101
Second lieutenants	17	9	46	21	27	.....	.....	120
Total commissioned	48	21	138	48	61	2	1	319
CIVILIAN								
Executives	3	4	5	9	2	1	.....	24
Volunteers	2	.....	1	4	.....	1	.....	8
Production experts	35	45	66	53	48	2	.....	249
A. M. engineers	.....	50	23	3	.....	.....	.....	76
Inspectors, A. and A. E.	2	10	74	.....	.....	.....	.....	86
Expert cost accountants	.....	.....	1	2	15	.....	.....	18
Stenographers	78	10	98	116	47	2	.....	351
Typists	52	4	44	49	40	.....	.....	189
Clerks	75	18	101	98	142	.....	.....	434
Catalogue and index clerks	21	1	19	13	8	.....	.....	62
Laborers	29	2	.....	.....	.....	.....	.....	31
Messengers	75	10	31	43	13	1	.....	173
Watchmen	56	.....	.....	.....	.....	.....	.....	56
Charwomen	68	1	.....	.....	.....	.....	.....	69
Telephone operators	20	.....	.....	.....	.....	.....	.....	20
Elevator operators	6	.....	.....	.....	.....	.....	.....	6
Miscellaneous	60	24	26	10	27	.....	.....	147
Total civilians	582	179	489	400	342	7	.....	1,999
Grand total	630	200	627	448	403	9	1	2,318

NOTE.—No enlisted men assigned.

These figures show an increase in personnel from May 24 to June 30 of approximately 24 per cent.

VII.

SPECIAL MISSIONS.

In order to carry out a thorough study of European production of aeroplanes, engines, and accessories, a special mission was sent overseas in June, 1918. This mission consisted of experienced experts from the United States on engines, planes, electrical equipment, contracts, instruments, and accessory apparatus.

The great distance from the front makes it a vital necessity to have representatives on the ground who have had experience with actual production facilities of the United States and are able to convey to the Service in France the limitations of what can be accomplished in the way of improvements and changes and at the same time keep the stream of production continually flowing. The lack of such experts in this new art of aeroplane construction and operation has made it exceedingly difficult to use this means of communication in the past, as the few men with experience have had to be kept in the United States in order to train the men necessary to develop the production required.

The necessity for continued liaison service between France and this country increases daily, but with the rapid training of the men responsible for the direction of the various departments this situation should be materially improved.

The bureau has also started the practice of sending experts in production and inspection from the United States to study methods used by the allies and take advantage of their four years' experience.

An invitation on the part of the allies has been given to the manufacturing plants of the United States to send their officers and plant managers to Europe to study European methods and adopt from their practice what will be of advantage to supplement American methods.

W. C. POTTER,

Acting Director of Aircraft Production.

Bowmon, George Orville	SLA; CFT
Briggs, Charles Ernest	SLA; CFT
Billings, Benjamin Franklin	SLA; MAT
Bierhardt, John Seymour	SLA; EOT
C	
Crawford, Frank H.	HHN
Corhett, Thomas C.	HHN
Cumming, Thomas William	SLA; SAG
Crawford, Harry Lee	SLA; EOT
Chapman, Amos Blackburn	SLA; MAT
Collins, Rohert Benton	SLA; MAT
Christensen, Ezra A.	RWT
Cleary, Maurice G.	HHN
Caldwell, Rohert M.	GLC
Cushman, Rohert C.	RWT
Clarke, Alexander Vinton	SLA; AAD
Clifton, Edgar T.	CAF
Cromhie, John Newell	SLA; EOT
Chamberlin, Clarence D.	PWM
Chandler, Harry A.	DAF
Cohh, John Devine	SLA; EOT
Clancy, Edwin M.	PFO
Cain, Howard B.	HHN
Callender, Leonard	KST
Cohb, James F., Jr	HHN
Carey, Harry M.	SLA; BFT
Cochrans, William R.	KST
Cowie, Franklin G.	RWT
Conrad, Franklin E.	KST
Coates, William T.	HHN
Chandler, George D.	EOT
Coe, Alfred L.	TFT
Clark, Harold L.	HHN
Craig, Howard A.	TMA
Clark, Wright	EOT
Clark, Richard H.	RWT
Corkville, John D.	TMA
Cottrell, George W.	TFT
Charlton, John P.	LDT
Cushman, Rohert G.	RWT
Cattermole, Edward L.	TFT
Connell, Samuel M.	HHN
D	
Dunham, Carroll	CPA
Davis, Calvin E.	SLA
Drehy, Ernest E.	PWM
Daggett, George William	SLA; PMT
Dean, Edward E.	DMA
Davis, William Bardsley	SLA; MAT
De Armond, George W.	LTC
Dean, Floyd Myrl	SLA; MAT
Davidson, Frank G.	HHN
Decker, Kenneth	HHN
Davies, Ward J.	CFT
Doyle, James Archie	SLA; MAT
Davis, Paul J.	TFT
Dudensing, Frank Valentine	SLA; PMT
Dougherty, Virgil Frank	SLA; BFT
Donovan, Lawrence J.	EOT
E	
Evans, Charles R.	EOT
Eller, Alfred	SLA; MAT
Everett, Edward Arthur	SBI
Edwards, Idwal H.	TMA
F	
Foster, Robert S.	KST
Fitzpatrick, Arthur	TFT
French, Guy Hatfield	SLA; EOT
Faneuf, Leo J.	TFT
Frost, John W.	HHN
Foltz, Joseph R.	TFT

Lieutenant Colonel Thomas Duncan, one of the few junior military aviators in the U. S. Air Service

Freeman, Orville B.	LDT
Fordyce, Addison	SLA; SBI
Foster, Van Butler	SLA; MAT
Foster, Edwin B.	CAF
Faust, Clyde Amhrose	SLA; BFT
Foster, Ellery N.	TFT
G	
Graham, James McDowell	SLA; MAT
Gray, Bryce	KST
Gillmore, William E.	DMA
Glidden, Charles J.	SAG
Griffith, Ralph E.	ELA
Grover, John H.	SAG
Gates, Fred Herhert	SLA; MAT
Gormley, Richard R.	TMA
Gelvin, Clyde Richardson	SLA; MAC
Gauntlett, John M.	DMA
Gile, Richard D.	HHN
Glenn, Ivo Burns	SLA; PMT
Gary, Martin Witherspoon	SLA; PMT
Gates, Miles Walker	SLA; MAT
Griffin, Bulkley Southworth	SLA; TMA
Gruhh, Walter Frank	SLA; EOT
Galvin, Patrick Joseph	SLA; RSD
Gregg, Alhert Edward	SLA; MAT
Grosvenor, Charles Niles, J.	PMT
Garrett, Ellis C.	HHN
Garrabrant, Arthur Anderson	SLA; EOT
Grevenberg, Carlos E.	CPA
Goggens, Joseph T.	TFT
Gihhons, Francis C.	TFT
Goodman, Timothy S.	KST
Gustafson, Charles Gustaf	SLA; BFT
Green, Alfred M.	HHN
Gilchrist, Hugh R.	PFO
Gurney, Chester Rainsford	PMT
Goodrich, Donald Reuhen	ELA
Grevenherg, Marien E.	CFT
Gay, Strawn Aldrich	SLA; CFT
Gaskell, Ellsworth F.	HHN
H	
Hagenah, Harry Bartell	SLA; SAG
Haslup, Charles Le Roy	SLA; RWT
Hines, Carter Elliott	SLA; SAG
Hassell, Bert Raymond John	SLA; CRI
Hurst, Donald Chaffee	MAC
Henry, William H.	RSD
Hoffman, Edward L.	HHN
Hellman, Isaac H.	DMA
Howell, George R.	DAP
Hooker, Charles J.	HHN
Hall, William T. I.	HHN
Hammett, Irving Russell	RWT
Hiatt, John B.	BFT
Hinman, Donald M.	HHN
Heberton, Craig	RWT
Holmes, Robert Anderson, Jr.	SLA; TMA
Hollstein, Arthur Watts	KST
Haston, John George	SLA; BFT
Hull, Perry A.	TFT
Holderman, Lester D.	TFT
Hamilton, Stewart A.	RWT
Hazeltine, Matthew E.	HHN
Hefron, Bernard M.	PFO
Hickey, Charles Keon	TMA
Hurt, Samuel F.	GLC
Hammond, Reginald G.	CFT
Hamilton, Edwin Coursault	EOT
Hyde, Clarence E.	HHN
Huffman, Carl F.	DAF

FOREIGN NEWS

Ambassador Page and Wife Fly in Dirigible

Rome.—Captain Guinaraess, of the Brazilian military aviation mission, has arrived and established headquarters here.

Ambassador and Mrs. Page were guests of Captain Guinaraess on board a dirigible December 14th.

Air Traffic Started Between German Cities

London.—Air traffic has been begun between some of the largest German towns, advices reaching here report. The aeroplanes are carrying parcel post matter and passengers. The fare per passenger is 2½ marks a kilometre or about a dollar a mile. The machines can fly at the rate of eighty miles an hour and the journey from Berlin to Munich, for instance, can be accomplished in 4½ hours.

One company is constructing a new, large type of aeroplane, able to carry forty passengers.

Aero Mail in India

The *Times* correspondent, writing from Simla on October 14th, says that the Government of India is considering a proposal to establish an aerial postal service in India.

The Transatlantic Flight

The first entry in Great Britain for the *Daily Mail* Trans-Atlantic prize was lodged with the Royal Aero Club on November 15th by the Whitehead Aircraft Co., Ltd. The machine is described as a Whitehead biplane fitted with four screws, each driven by a 400 h.p. Liberty engine. The machine, which is said to be nearing completion, is of 120 ft. span and an overall length of 65 ft., while the speed is expected to be in the neighborhood of 115 m.p.h. It is proposed to start early next year from Whitehead Park, Feltham, and replenish fuel tanks at Oranmore, Galway. Capt. Arthur Payze, R.A.F., is nominated as the pilot, and he will be accompanied by an assistant pilot, a navigator, and one mechanic.

The London-to-Paris Air Service

If promptitude counts for anything, the prospects for commercial aviation after the war are certainly bright, for scarcely had the armistice been established as an accomplished fact when it was made known that at least one firm is ready to inaugurate an aerial passenger service as soon as conditions permit. Mr. G. Holt Thomas, managing director of the Aircraft Manufacturing Company and various other enterprises, state that arrangements have already been made for a passenger service between Paris and London. As Mr. Holt Thomas points out, the fact the British celestial rights end in mid-Channel will practically preclude all-British companies from establishing international air routes, and for aerial mail routes at any rate the rights of both countries concerned in the enterprise will have to be considered.

With regard to the proposed London-to-Paris passenger service, the arrangements at English end will be in the hands of Aircraft Transport and Travel, Ltd., a company registered by Mr. Holt Thomas, and which is under the same direction as the Aircraft Manufacturing Co., Ltd., and other aviation enterprises in which Mr. Holt Thomas is interested. In France the interests of the company will be looked after by an allied company, the Compagnie Générale Transaérienne, of which M. Henri Deutsche de la Meurthe is President. It is proposed to make the Ritz Hotel, Piccadilly, the starting point at this end, while the French terminus will be the Ritz Hotel, Place Vendôme, Paris. The time-table that has been drawn up, and which, with the machines it is proposed to use, it should in most cases be quite possible to adhere to or even to improve upon, is as follows:

Departure by motor car, Ritz Hotel, London	10.00 a. m.
Departure from London aerodrome	10.30 a. m.
Arrival Paris aerodrome	1.00 p.m.
Arrival Ritz Hotel, Paris	1.30 p. m.

The fare has at present been fixed at 15 guineas, which will, it is expected, include an insurance for £1,000 for each passenger.

The first ticket at £15 15s. was purchased on Friday by the Hon. Sir Arthur Stanley, M.P., chairman of the Red Cross Society, while other purchasers of tickets on that day were Mr. E. Manville, chairman, Associated Chambers of Commerce; Mr. Percy Martin, managing director, the Daimler Co.; Mr. Julian Orde, secretary, Royal Automobile Club; Mr. H. J. Irish, Sir John and Lady Shelley Rolls, Lieut. Guy A. Reed, U.S.; Mrs. Robert Rankin (three tickets), the Hon. Kathleen Robson (two), Mrs. Alec Tweedie, Mr. A. E. Nathan, and Mrs. Locke King.

The machines to be used at first will be of a type that was designed for quite a different purpose, *i. e.*, for long-distance raids into Germany, but with very little alteration they will be very suitable for the more peaceful purpose to which they are now being put. Like all the other famous machines produced by the Aircraft Manufacturing Co., they were designed by that firm's distinguished designer, Capt. Geoffrey de Haviland, whose designs have played such an important part in the aerial supremacy of the Allies over Germany. These machines are twin-engined bombers, but not of such a large size as others which have been employed for long-distance bomb raids. They are, however, very fast—somewhere about 130 m.p.h.—so that it may be confidently expected that, except under extraordinarily bad weather conditions, an average speed over the ground of 100 m.p.h. will be maintained.

Night Stops On Islands Proposed for Trans-Oceanic Aeroplanes

Crossing the ocean and continents in aeroplanes not equipped with sleeping facilities is proposed by the "Rivista Del l'Aviazione," an aviation review published in Italy, according to the Italian Bureau of Public Information. The review figures that small, swift aeroplanes, even though they would have to stop for ten hours at night for the sleep of the passengers, could cover more ground in less time than a large aeroplane which would not have to stop because it carried its sleeping accommodations with it.

Practical examples of how long flights could be made are given. The lightest aeroplanes and those of small dimensions have at present a velocity of from 112 to 135 miles an hour. By flying fourteen continuous hours, the review figures that in a single flight, without alighting, it is possible to traverse from 1,550 to 1,900 miles, which is greater than any single stretch of ocean without intervening islands. Many small ocean islands could be converted into dormitories for aeroplanes and their passengers. The hours lost in alighting and stopping on the islands would be made up for by the greater speed made possible by the light weight of the aeroplane.

Aerial flights, the review further observes, even though made less swift because of the nocturnal stops, would still represent a great saving in time when compared with steam and rail trips. The most rapid transatlantic steamer today requires four days to complete the trip from England to the United States. An aeroplane would require, including a nocturnal stop on the Canary Islands, Bermuda or Newfoundland, not more than two days. The crossing between Europe and South America, with nocturnal stops at the Canary Islands, Madeira, Asuncion and Trinidad, would require not more than four days, calculating fourteen hours of flight to ten of rest.

Tests of these proposed flghts without sleeping on board will soon be made, according to the review, in flights between Europe and India. These may even be inaugurated before the conclusion of the present war.

The development and perfection of these small planes need not mean the exclusion of the larger ones, of which the Caproni are typical. The review pleads for the development of all types of aeroplanes, large and small. Gianni Caproni, designer of the famous huge Caproni aeroplanes, recently published the designs for two new triplanes with cabins de luxe and accommodations for twenty-four passengers. The review does not question their success, but it would like to see developed simultaneously with them the small, swift aeroplane, which it believes will prove supreme in transportation after the war as it has in warfare.

Italian Veneer-Wood Industry

Veneer-wood, a manufactured wood used especially in aeroplane construction, the Italian Bureau of Public Information states, is now being manufactured on a large scale in Italy, whereas formerly almost the entire amount used in Italy was imported from Austria. With the establishment of many factories in the northern part of Italy and a few in the south the manufacture of veneer-wood may now be called a national industry.

The many uses of this wood for war purposes have resulted in its production on a large scale. Veneer-wood is a composition of three strata of thin wood placed upon one another with the fibres running in opposite directions. This gives to the wood greater resistance in proportion to its weight than any other wood known. The combination produces a strong wood, which is light in weight, is elastic and still keeps its shape. At present it is extensively used in aeroplane and hydroplane construction.

The only factory for veneer-wood in Italy before the war had an output of about 100 square yards a day. At present, with the introduction of modern machinery, the national output has been increased to more than 5,000 square miles daily.

A New Observation Balloon

Italy's success in aviation, according to the Italian Bureau of Public Information, is no longer a subject of discussion; not only the individual records of Italian aviators speak for themselves, but also the daily work of the Italian planes on the Italian or French fronts are hard facts that the world at large concedes. The Caproni, the Fiat, the Ansaldo, and the Pomilio companies are daily producing many aeroplanes, and the Italian aviation has actually a record of speed in production, efficiency and thoroughness. But not only in aviation, but also in aeronautics Italy has come to the front. There is, for instance, a new observation balloon that is now about to be used by all the Allied armies, which is the invention of an Italian army officer, Major Brassoni, of the Italian Army Engineers. The particular merits of this balloon are the extraordinary stability and its powers of suspension. Moreover, a most important factor, there are absolutely no metal parts exposed that might cause any damage by electricity. This allows the observers to stay up even in an electric storm without any more than the average danger of being, for instance, on a tree. The observer's basket communicates with the crew on the ground by means of a wireless telephone. Six months ago this balloon rose to a height of 16,000 feet over London, which in itself was a record for an observation balloon.

Aero-Navigation in Europe

Notwithstanding the cold, matter-of-fact wording of the report of the Italian Permanent Commission for Aeronautics, the fact remains, says the Italian Bureau of Public Information, that a wonderful, almost impossible dream of a near past has been declared not only a possibility, but will be a reality before long. The committee reported "that the plans for the regular aero-navigation between the various capitals of the Allied nations and that of the subsidiary lines across the Mediterranean have been approved."

Pushes Aircraft Surrender

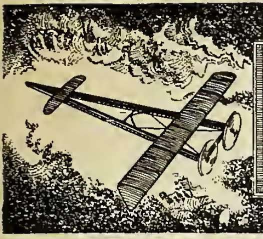
London (British Wireless Service.)—The surrender of the 2,000 German aeroplanes required under the terms of the armistice convention has been proceeding the last week, and it is expected that the full complement of enemy machines will soon be in the Allies' hands.

The taking over, examining, and parking of so vast a fleet of machines has necessarily taken time, as the German armies in their retirement are leaving the planes behind in their evacuated aerodromes. Difficulties and attempted evasions connected with the precise proportion of the types of aircraft to be turned over and the air worthiness of some of the machines surrendered are being adjusted in response to firm representations by Marshal Foch on behalf of the Allies.

Some light is thrown upon what this gigantic surrender of aircraft means to the Germans by the official British figures of air fighting upon the British western front from January I, 1918, to the date of the armistice. These figures show the number of enemy machines destroyed in aerial combats by the British to have been 3,060, while enemy machines driven down out of control numbered 1,174.

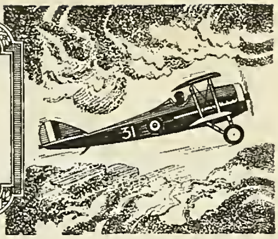
Germany is known to have lost well over 6,000 aeroplanes, destroyed and surrendered, in the present year.

On the other hand, the resources of the Allies are being reinforced by 2,000 German machines of modern type and in good condition.



ELEMENTARY AERONAUTICS *and* MODEL NOTES

By John F. McMahon

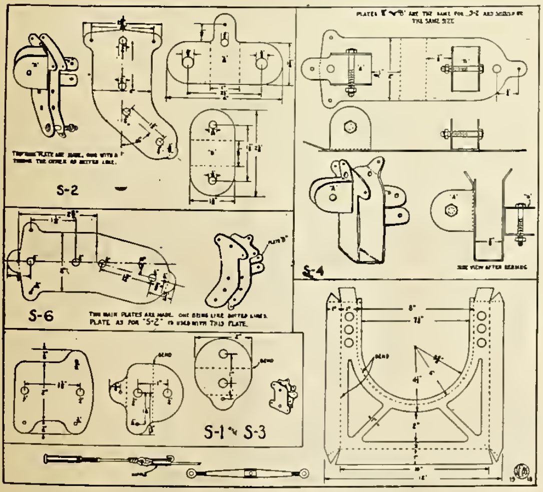


Model Aeroplane Building as a Step to Aeronautical Engineering

The fuselage is braced with No. 30 Piano Wire drawn up taut by the use of turnbuckles. The sections at the pilot's seat and to the rear are tightened with the bicycle type as illustrated previously while the sections around the engine and wings have regular small size turnbuckles. When fastening the piano wire to the turnbuckle a nipple is used to hold the hook in place, the wire being bent to a small loop and the end slipped through the nipple after which it is bent over, as shown in the sketch at the lower part of the picture. The regular turnbuckles should be no longer than 4″. Before bending the wires it would be better to measure the correct distance from one terminal point to the end of the turnbuckles, having the turnbuckle wide open, then making the loop around a jig of some kind. The turnbuckles bracing the sides of the machine should be up near the top of the fuselage to enable one to get at them easily should they loosen and have to be taken up.

The special fittings S-1, S-2, etc., should be made. These are constructed of sheet steel .10 inch thick. The correct sizes and shapes can be had by consulting the drawings. S-1, and S-3 are for attaching the upper struts in place. The combination consisting of three plates made to the sizes given and then assembled as shown in the sketch. S-2 is the rear landing chassis strut and wing fitting combined. Two plates of the same size and shape and two separate plates, one for the inner bracing strut, the other for the wing fastening and flying wire attachment. When making this combination one should be made left-handed and the other right, that is when making it, have the wing attachment on the right hand side on one fitting and on the left hand side for the other. The bolts for these fittings are ¼″ S. A. E. thread and case hardened if possible. S-4 is for the forward wing attachments and you will notice that the landing chassis plate is missing and the wing plate is higher as in the strut fitting inside. This fitting will need a filler block of wood between the two main plates just above the longeron.

S-6 is for the forward landing chassis strut and engine strut. No wing fitting is needed as you will see. When assembling, the plates they should be welded or carefully riveted together.


S-2
S-6
S-4
S-1 & S-3
SIDE VIEW AFTER BENDING
BEND
PLATE "B"
THE MAIN PLATES ARE MADE, ONE BEING LIKE DOTTED LINES. PLATE AS FOR "S-2" IS USED WITH THIS PLATE.

Details of metal fittings for the Ford motored tractor

A nose plate for the front of the machine is shown also with dimensions.

The conrols and landing chassis are next to be considered.

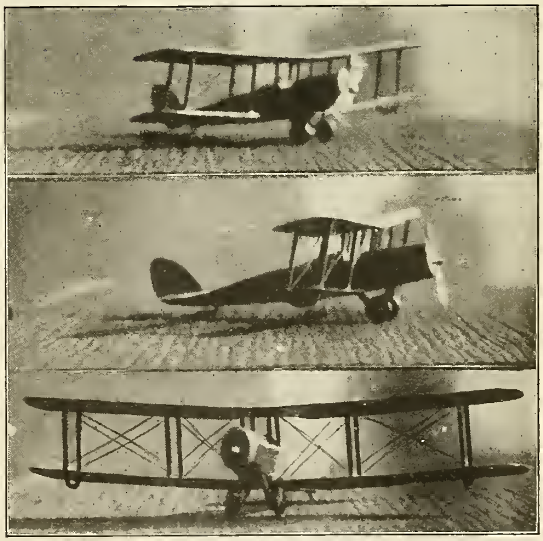
(To be continued)

The Smallest D H 4

The accompanying photograph shows what is supposed to be the smallest D H 4 battle plane known. This model, although having the general appearance of its big battle plane prototype, is only 9″ span and was built by the Model Editor for Mr. Henry Woodhouse as a radiator ornament. The model was used as a sample for castings which are to be made in order to build a quantity of these machines.

The body is made of solid wood, the wheels of turned aluminum, the struts of $^3/_{32}$″ tubing and the planes, tail, and rudder of tin. The struts, wires, and planes are fastened with solder. The propeller is free to revolve, which it does when the automobile is moving. The fastening for the model consists of a horseshoe-shaped strip of ⅛″ x ½″ brass, which is clamped around the filler of the radiator by means of a bolt, while at the other end is fastened a ⅛″ drill rod threaded and which passed through the body at the gunner's ring after which the nuts are tightened and the model is held rigidly.

Mr. Attilio Di Sabato of the Aerial Age staff photographed the model.



A D.H.4. Radiator Ornament

Notice to Readers of This Page

It is our intention to have a contest for construction and flying of models to begin the first of the year. The editor would like to hear from every model builder who is a reader of this page, so that we might line up the names of those who wish to take part in the contest. In fact, it will be well for all model readers, whether flyers or not, to communicate with the editor, so that we might be able to arrange some other kind of a contest for their benefit. Let us hear from you even if it is only a postal card with your name and address on it.

During the war many model flyers who were called to the colors did not have as much time to devote to model flying as they might have had, but now that peace is in the air they will come back and study aviation more seriously than ever.

Aeronitis is a pleasant, a decidedly infectious ailment, which makes its victims "flighty," mentally and physically. At times it has a pathologic, at times merely a psychologic foundation. It already has affected thousands; it will get the rest of the world in time. Its symptoms vary in each case and each victim has a different story to tell. When you finish this column YOU may be infected, and may have a story all of your own. If so, your contribution will be welcomed by your fellow AERONUTS. Initials of contributor will be printed when requested.

" 'E Ain't No Bloomin' 'Ero"

You can talk about the infantry, the cavalry, artillery, the tank men, and the rank men, and the rapid firing squads; but the boys who do the fixing, when your darned old "carb's" not mixing,. are the greasy old mechanics, and they ask no man for odds.

No medals they'll be getting, no cheers, or public petting, but you'll find them in the front line—when you need them, they'll be there. With a monkey wrench and hammer, midst the battle's roar and clammer, they're the guys that keep the army's eyes, the flyers, in the air.

Oh, his overalls are greasy, but when your engine's wheezy, he's the doctor that can fix it, you can bet your life on that. Tho' he has no gun for shooting, and no one his horn is tooting, he is serving Uncle Sammy with the "bean" beneath his hat.

So Here's to you, "Motor Mech", may you always be on deck; and serving Uncle Sammy, in your own peculiar way. Tho' you get no public petting, it's ten to one in betting, that "Bill" will know you've been there when he has his debt to pay.—Exchange.

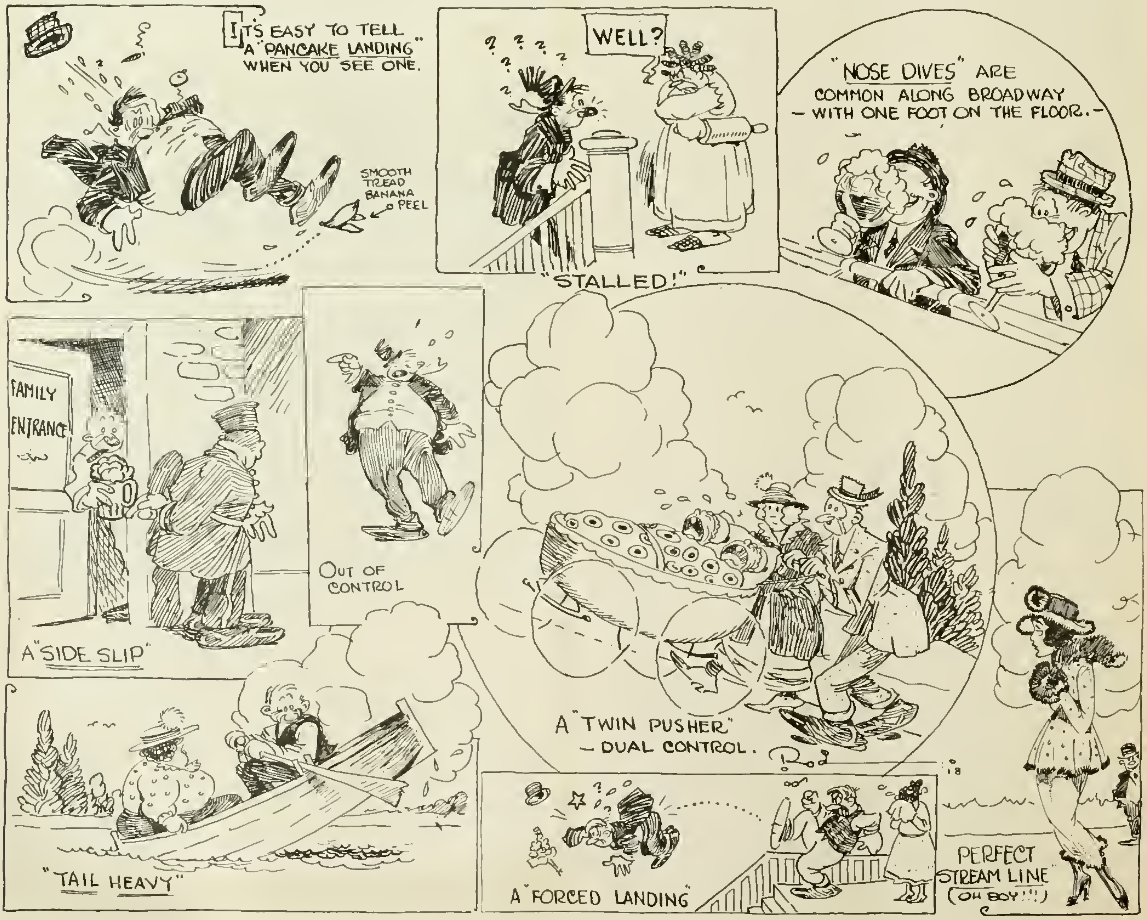
Platsburg Officer—Mr. Blank, explain the moving pivot.

The Rookie—A moving pivot pivs; and, having pived, moves on.

The longer we stick around the human hemisphere the more we realize Uncle Jake, who sowed a few oats in his day himself. hit the spike squarely on the bean when he said: "Tomorrow's flight depends a whole lot on your take-offs today.—Plane News.

The New Nursery

Pussy cat, Pussy cat, where have you been?
I've been up in a flying machine.
Pussy cat, Pussy cat, what have you seen?
I saw our aviators drop bombs on Berlin.
—By H. C. Wirth (with apologies to
Mother Goose Nursery Rhymes).


IT'S EASY TO TELL A "PANCAKE LANDING" WHEN YOU SEE ONE.
SMOOTH TREAD BANANA PEEL
WELL?
"STALLED!"
"NOSE DIVES" ARE COMMON ALONG BROADWAY – WITH ONE FOOT ON THE FLOOR.–
FAMILY ENTRANCE
A "SIDE SLIP"
OUT OF CONTROL
A "TWIN PUSHER" – DUAL CONTROL.
Rod '18
"TAIL HEAVY"
A "FORCED LANDING"
PERFECT STREAM LINE (OH BOY!!!)

(Sontinued from page 773)

Fig. 7 shows the H.P. and fuel consumption of the motor at ground level and at 9000 ft. altitude.

Fig. 8 shows the H.P. and fuel consumption as a function of the decreasing barometric pressures.

Fig. 9 is a timing diagram of the motor giving timing of the valves as a function the angular crank movement.

Fig. 10 Longitudinal Section through the direct type 120 x 130 mm. motor, 150 and 180 H.P.

In addition to the types and sizes here described, there has been developed a larger size of motor which is built in eight and sixteen cylinders capable of giving 300 and 600 H.P. respectively. The design is identically the same as the 120 x 130 mm. motor, excepting that the sizes have been increased to 140 mm. bore and stroke.

Table 3. Hispano-Suiza Motors

Reduction Gears

	No. Teeth	Face	Module	Helical Angle	Motor R.P.M.	Propeller R. P. M.	
Pinion & Gear.	21 & 28	60 mm.	5.25	8 deg.	2000	1500	
200 H. P.....	22 & 62	70 mm.	4.5	6 “	2000	700	(Gas Bag Dirigible)
and	26 & 39	60 mm.	4	5° 43″	2000	1333	
220 H. P.....	24 & 41	60 mm.	4	5° 43″	2000	1170	
	36 & 48	40 mm.	4.5	6°	2000	1500	Cannon type
300 H. P.....	26 & 44	54 50	6	5°	2000	1180	

Table 4. Hispano-Suiza Motors

Rated H. P.	Piston Displacement in cu. in.	Wt. in Kilograms	Weight in lbs.	Weight Per 1 H. P.	Cu. in. of Displacement Per 1 H. P.
150	708	190	419	2.77	4.72
180	708	192	422	2.35	3.93
200	708	230	506	2.53	3.54
220	708	230	506	2.3	3.21
300	1165	250	550	1.83	3.88
350	1248	290	638	1.82	3.57
400	1416	475	1045	2.62	3.54

Rated H. P.	Comp. Ratio	Compresion in Kilograms Per Cm.^{2}	Pressure in lbs. Per sq. in.	Fuel consumption Per H. P. Hour in Kilograms Gasoline	Oil
150	4.7	7.5	106	0.231	0.009
180	5.3	8.74	124	0.233	0.012
200	4.7	7.5	106	0.235	0.015
220	5.3	8.74	124		
300	5.3	8.74	124		
350	5.3	8.74	124		
350	4.7	7.5	106		
	5				
	5.65				
	6				

Leonard Wood, Major General U. S. A.

As combat's roar and din subside
  And battle's smoke is blown away
We see a figure by our side
  Whose life is open as the day.

A patriot and a soldier true
  He sensed his country's peril great
Too proud a soul to bow or sue
  He spoke his mind to land and State.

The pigmies that he tried to aid
  Misunderstood his nature grand,
And fated him to never fade
  From hearts of countrymen and land.

His martial soul was on the Mons
  His spirit fought at Thierry's Grove
He stands among his country's sons
  Full decorated by their love.

We owe a debt of gratitude
  To Leonard Wood, it's hard to pay,
His chance destroyed by party feud
  Will come again as bright as day.

For history's unerring eye
  Has seen and chronicled the facts
And it will all his foes defy
  By simply pointing to his acts.

George L. Upshur.

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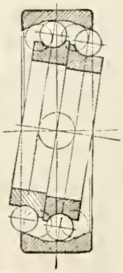

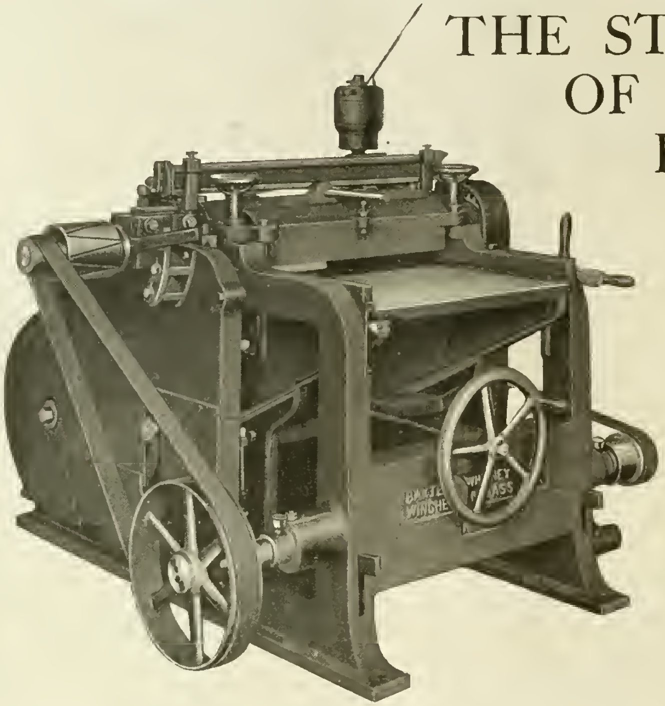

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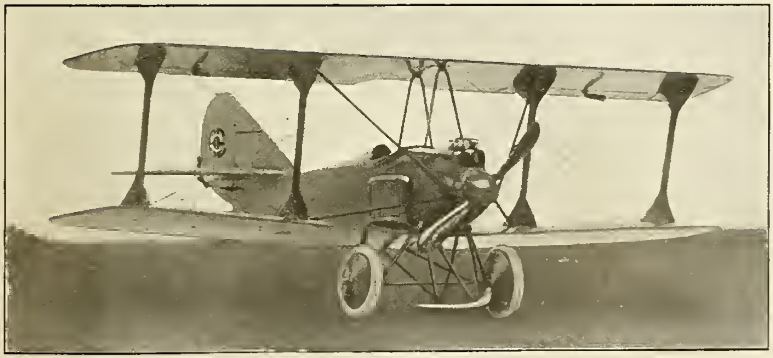

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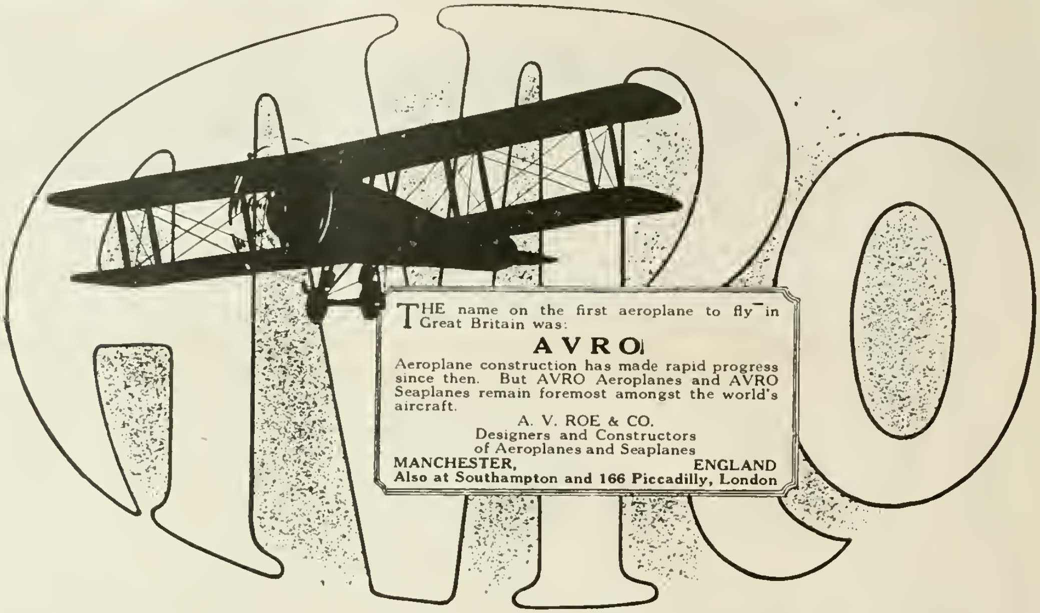

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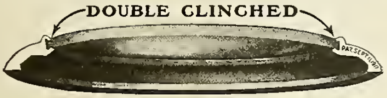

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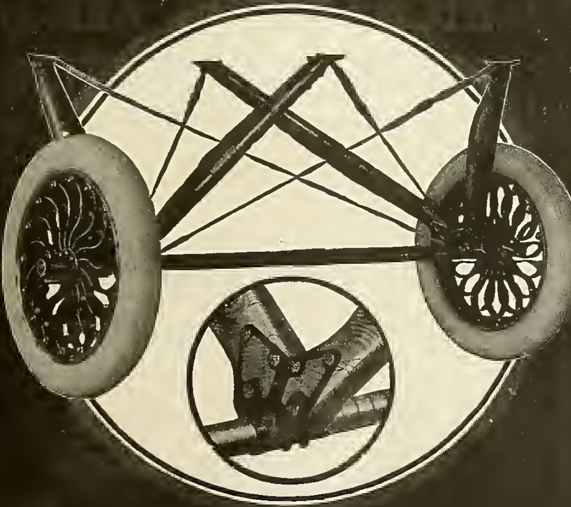

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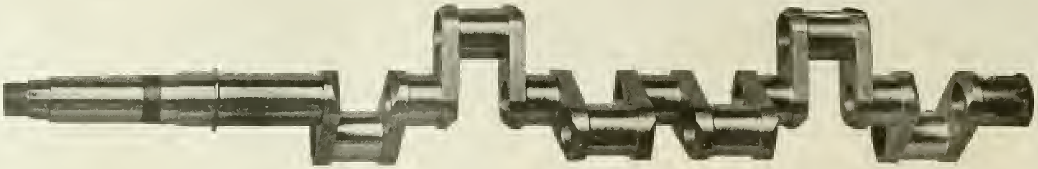

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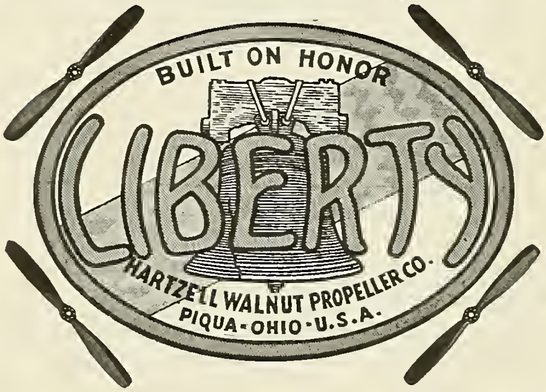
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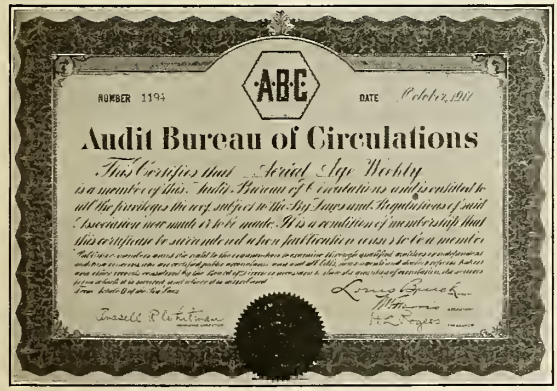

A·B·C

NUMBER 1194 DATE October, 1917

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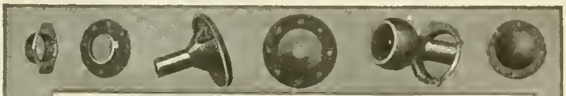

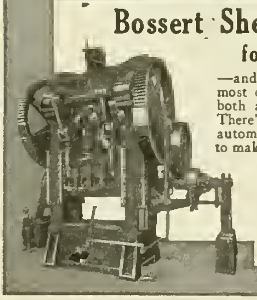

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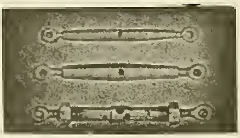

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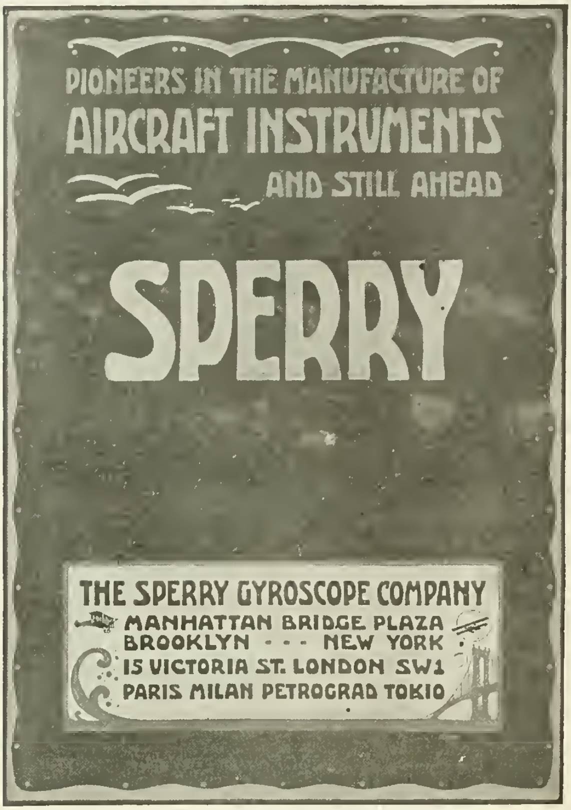

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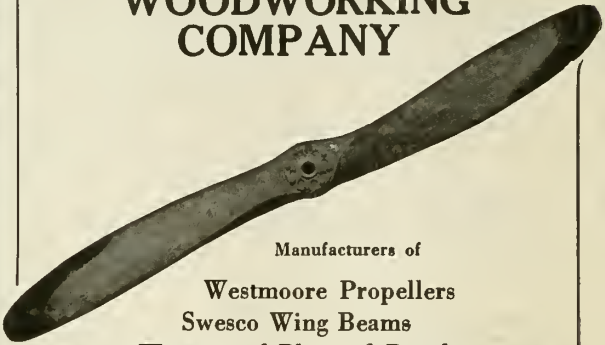

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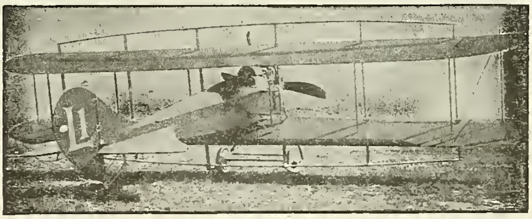

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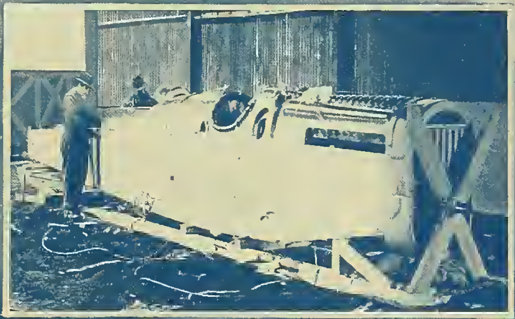

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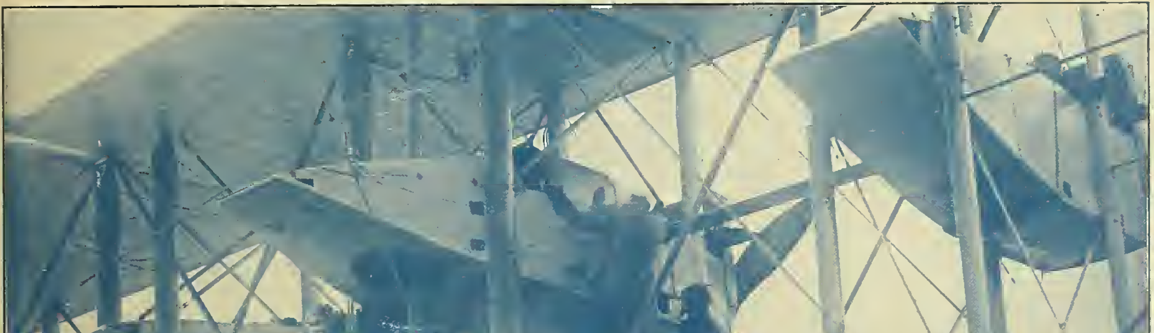

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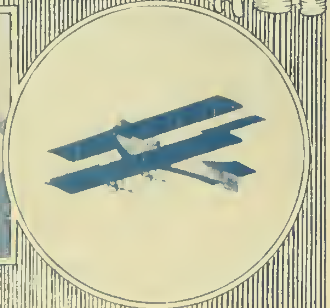
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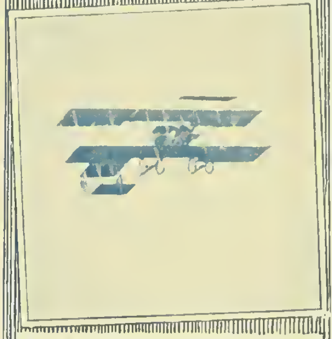
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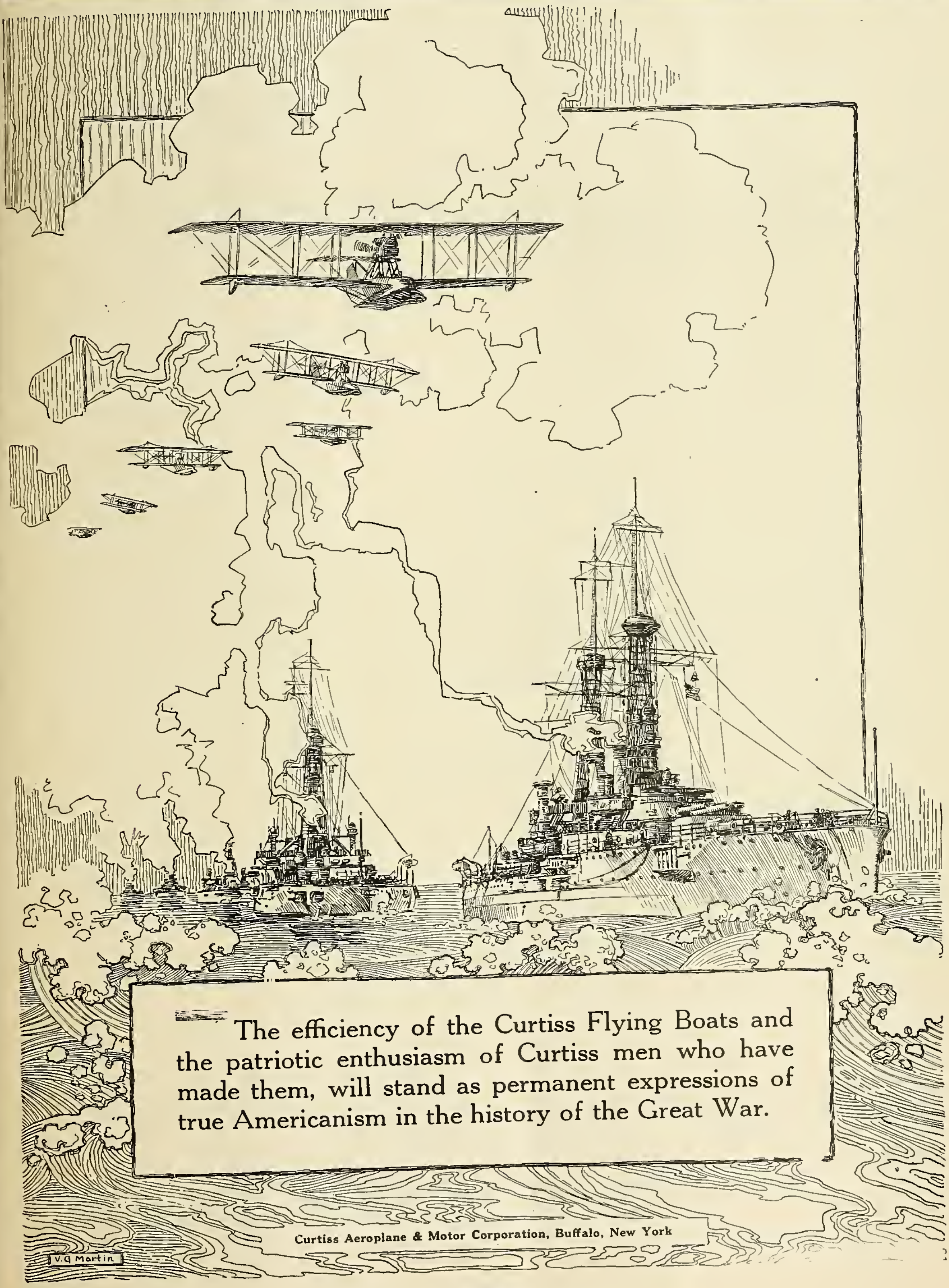

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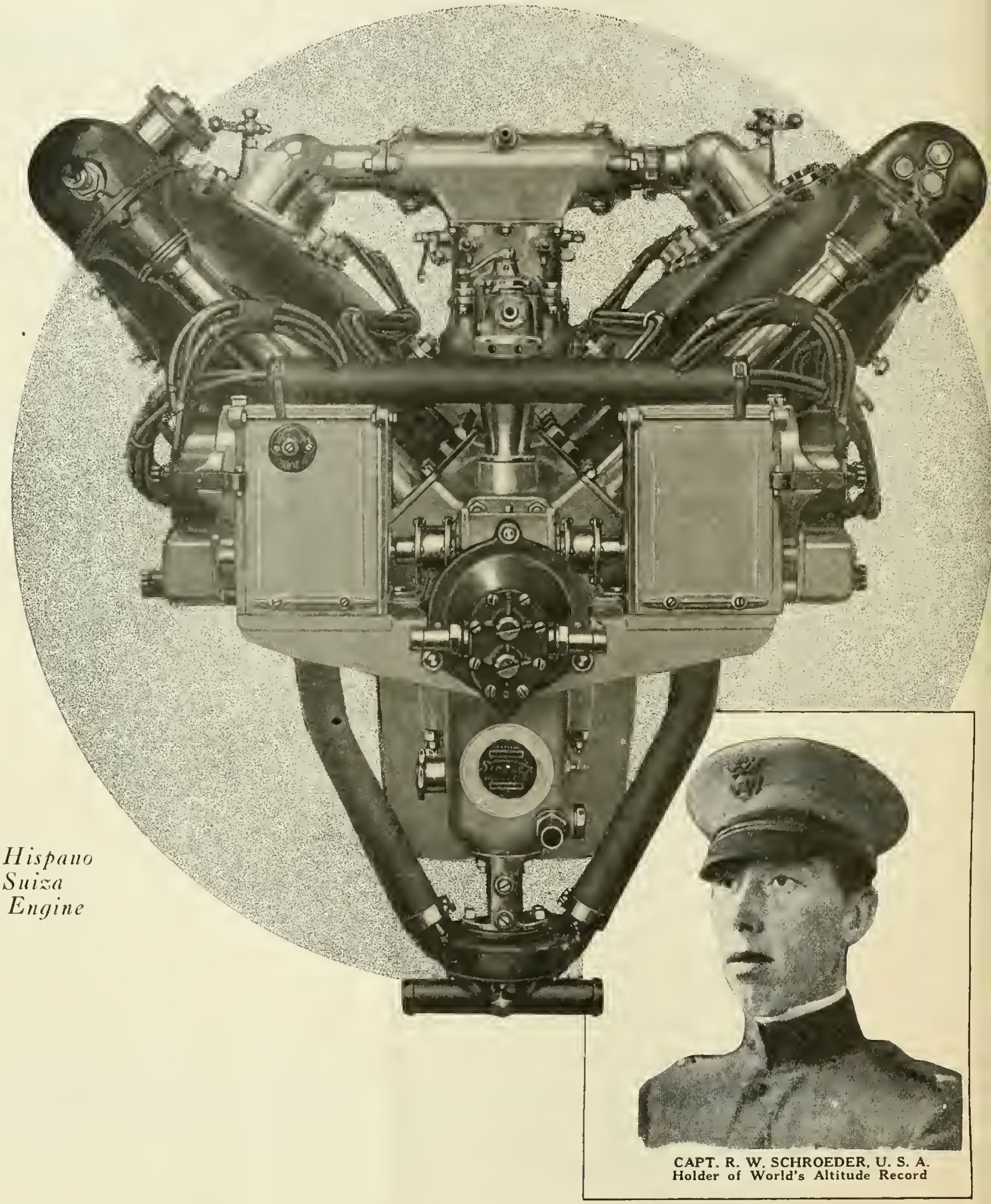

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VOL. VIII JANUARY 6, 1919 No. 17

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VOL. VIII NEW YORK, JANUARY 6, 1919 NO. 17

$1,000 CURTISS MARINE FLYING TROPHY PRIZE WON BY MARINE CORPS

THE competition for the Curtiss Marine Flying Trophy and the $1,000.00 cash prize ended on December 31st, 1918, with Lieutenant T. C. Rodman, U. S. Marine Corps, as the winner of the prize and the Aero Club of America as the winner of the Trophy.

Lieutenant Rodman won the trophy with a flight of 900 miles, made with a large H-16 type Curtiss Flying Boat at Pensacola, Florida.

Another flight was made by the veteran naval aviator, Lieutenant-Commander P. N. L. Bellinger, U. S. N., who covered a distance of 651 miles without stopping, with five passengers besides himself. He made the flight in 9 hours and one minute.

Both flights were in competition for the Curtiss Marine Flying Trophy and the $1,000 cash prize, which ended on December 31st, 1918, with Lieutenant T. C. Rodman, U. S. M. C., as the winner of the prize, and the Aero Club of America as the winner of the Trophy.

Lieutenant Rodman won the Trophy with a flight of over 900 miles, including the 5 per cent increase for each of the eleven passengers which he carried. It was made with a large H-16 type Curtiss Flying Boat, at Pensacola, Florida. Commander Bellinger covered close to 850 miles. Had he carried additional passengers instead of carrying dead weight he would have had a larger mileage even than Lieutenant Rodman.

The following aviators competed for the Trophy:

1. Stewart W. Cogswell, flying an Aeromarine plane, equipped with 130 H.P. Aeromarine motor, at Keyport, New York, representing the Aero Club of America.
2. Lieutenant Thomas Clifford Rodman, U. S. Naval Air Station, Pensacola, Florida, flying a H-16 U. S. N. Curtiss type Flying Boat, equipped with two Liberty motors, representing the Aero Club of America.
3. Lieutenant Fitz William Dalrymple, Jr., U. S. Naval Air Station, Miami, Florida, flying a H. S. 2 Curtiss Flying Boat, equipped with two Liberty motors, representing the Aero Club of America.
4. Lieutenant G. B. Newman, U. S. M. C. R., Miami Flying Field, Miami, Florida, flying a Hydro-aeroplane JN4H, converted to a hydro-aeroplane by removal of landing gear and substituting an N9 Pontoon, equipped with a Hispano-Suiza 150 H.P. motor, representing the Aero Club of America.
5. Lieutenant Douglas Manning, U. S. M. C., Miami Flying Field, Miami, Florida, flying a H. S. 2 Curtiss Flying Boat, equipped with two Liberty motors, representing the Aero Club of America.
6. Lieutenant-Commander P. N. L. Bellinger, U. S. N., flying a Curtiss Flying Boat, equipped with Liberty Motors, representing the Aero Club of America.

The report of other entries and judges will be given in the next number of Aerial Age.

The complete reports of all the flights made for the trophy will not be available for a few days owing to the number of flights made at the different Naval and Marine Stations and elsewhere on the last day of the race and the closeness of the records, but it seems final from the reports that Lieutenant Rodman is the winner.

The telegraphic report of Lieutenant (J.G.) E. L. Mitchell, U. S. N., who acted as judge with Ensigns R. A. Talbot and M. S. Martin, at Pensacola, states that Lieutenant Rodman started at 6.50 A.M. on December 30th with eleven passengers. Landed at two minutes past four o'clock P.M., having covered a distance of 581 nautical miles, having made one landing to get gasolene.

Under the rules there is a penalty of five per cent for each landing and an increase of five per cent for each passenger carried. While the exact total will not be known until the detailed report of the judges are received, the estimates show that Lieutenant Rodman is entitled to a distance of over 900 miles.

The first flight for the Curtiss Marine Flying Trophy for 1918 was made on October 25th. Stewart W. Cogswell competed for the trophy, using an Aeromarine seaplane, with 130 H.P. Aeromarine motor. Mr. Cogswell flew over a course of 15 miles between Keyport, N. J., and Coney Island, L. I., and made a total distance of 540 miles in the actual flying time of 7 hours and 59 minutes, making 36 laps. From the total mileage a penalty of 5 per cent is deducted on account of flying over a broken course, and an added penalty of 10 per cent is deducted on account of two stops, leaving the net distance 459 miles, made at an average speed of 68.40 miles per hour. The fastest lap was made in 24¼ minutes, or at the rate of 76.50 miles per hour, and the two stops were made for fuel. A cross wind was blowing which increased materially just before noon. The official observers were Ensign Edward E. Jeffries, U. S. N., and Mr. T. W. Post.

Under the rules, the $1,000.00 cash prize that goes with the Curtiss Trophy for 1918 goes to the winning pilot, who must be a member of the Aero Club of America or an Aero Club affiliated with it, and he becomes the record holder of the trophy, which is to be held in custody by the Aero Club of America. A Club becomes the owner of the Trophy after the fifth year if it has been won for three consecutive years by its members. As a member of the Aero Club of America has won this Trophy three times in succession, it will become the permanent holder. The winners were: In 1915, Oscar A. Brindley, 443.72 miles; in 1916, Victor Carlstrom, 661.44 miles; in 1917, Caleb Bragg, 296.92 miles.

PRIZE OFFERED FOR PARACHUTE COMPETITION

TO BRING about the development of a parachute which will be to the aviators and air travellers what the life preserver is to sea travellers, Mrs. Louis Bennett has offered to the Aero Club of America $500.00 to be awarded as a prize or prizes to be awarded in a parachute competition.

Mrs. Bennett's son, Lieutenant Louis Bennett, R. A. F., who was a member of the Aero Club of America, lost his life in an air fight at the front; and Mrs. Bennett, believing that her boy's life, like the lives of many other aviators, including Major Lufbery, could have been saved had they had a parachute, wishes to do everything in her power to develop such a parachute.

The Executive Committee of the Aero Club of America has accepted the offer, and Mr. Alan R. Hawley, the President of the Club, has appointed the following committee of experts, members of the Club, to draw the rules and regulations for the contest.

Major Thomas S. Baldwin, U. S. A., the veteran aeronaut, who made his first parachute jump in 1885 and has made hundreds of parachute jumps from balloons;

A. Leo Stevens, another veteran aeronaut, also one of the U. S. Army experts, who was one of the first to arrange for parachute descents from aeroplanes, at the time when the speed of aeroplanes was only from 35 to 50 miles per hour;

Colonel A. L. Fuller, in charge of the Balloon Section, U. S. Army;

Colonel Henry B. Hersey, U. S. Army, another veteran expert, who made parachute descents from kite balloons at Omaha in the Summer of 1917;

Colonel James Prentice, U. S. A., veteran balloonist.

Lieutenant Colonel Wm. Thaw, the dean of the Lafayette Escadrille aviators, who has had extensive experience at the front;

Major Cushman A. Rice, U. S. A., who also has had extensive experience with aeroplanes at the front;

Congressman F. La Guardia, who until recently was Major in the U. S. Army in Italy and flew in the large Caproni aeroplanes;

Major R. W. Schroeder, the holder of the world's altitude record of 28,900 feet;

Rear Admiral Mark L. Bristol, U. S. N., former Director of Naval Aeronautics;

Commander Henry C. Mustin, U. S. N., veteran naval aviator;

Commander John H. Towers, U. S. N.

Lieutenant Commander P. N. L. Bellinger, U. S. N.,

Lieutenant Godfrey L. Cabot, U. S. N.,

Lieutenant R. A. D. Preston, U. S. N.,

Ensign Raffe Emerson, U. S. A.

All the officers who have had a number of years of experience in aeronautics; and Henry Woodhouse, Frank S. Lahm, and Augustus Post, who have given years to the study of the different branches of the service and are familiar with the different problems.

This committee was selected with due consideration of the fact that the problems are many sided and that besides securing an efficient parachute it is necessary to find the safe methods of attaching the parachute to the aeroplanes, and that the methods may have to be different for large aeroplanes or small aeroplanes and land machines and seaplanes.

If the competition shows that efficient parachutes are to be had, and fool proof methods of using it are decided upon, it is expected that carrying parachutes on aeroplanes will be made compulsory, just as it is compulsory to carry life preservers on board of vessels at sea.

It is the belief of the Aero Club authorities that this competition will be extensive, because a large number of parachutes have been evolved during the war. It is known that the Goodyear Company and Lawrence B. Sperry have two excellent parachutes. Lawrence B. Sperry tried his from a fast aeroplane and the first test was successful. A number of other types of aeroplanes were given preliminary tests by the Army and Navy. The competiton will be international in character and will afford a thorough test for every kind of parachute.

The most important problems to be solved are defined by Mr. Henry Woodhouse as follows:

"The main problems which remain to be solved," said Mr. Woodhouse, "are the problems connected with the use of the parachute in flying aeroplanes. Some of these problems are as follows:

"(1) To find the best way to attach a parachute to an aeroplane or to the aviator, so that it can be operated whether the aeroplane is at an even keel, or climbing, or diving, or side-slipping, or upside down.

"(2) It must be membered that when a plane is travelling at a speed of from 90 to 150 miles an hour—and there are machines going even faster—the pilot only has seconds in which to think and act, therefore, the parachute attachment must be simple and must work instantly.

"(3) The parachute may be fastened to the back of the pilot himself, or to the aeroplane, on the fuselage, back of the pilot; or under or to the side of the fuselage, or at the trailing edge of the lower panel of the wing, or to the seat of the aeroplane. But it must be remembered that the pilot is fastened to his seat by a safety belt which he must unfasten before the parachute is opened, else he will have the unpleasant experience of having the parachute pull the upper half of his body in the opposite direction from which he is travelling. The parachute would eventually collapse, but so would the aviator.

"(4) Having found the best method of attaching the parachute, the next important thing is to have a parachute that opens quickly, does not drop too fast and does not oscillate overmuch while descending. The average parachute opens in about a 150 foot drop, then descends at a speed of about 20 feet a second.

"(5) A parachute need not be heavy to be safe, and weight is objected to in aeroplanes because it decreases the useful load of the plane. A parachute of Japanese silk, about 18 feet in diameter, capable of sustaining a man weighing 150 pounds, will not weigh more than 15 pounds. The fear on the part of aviators that a parachute would weigh 40 or 50 pounds is one of the factors which has retarded the adoption of the parachute as a life saver. A large parachute is bad because it oscillates and slides sideways after it oscillates. On the other hand, a too small parachute will travel down too fast.

"(6) Such pioneers as Thomas S. Baldwin and A. Leo Stevens found by practice that they could, to some extent, control the direction of the fall of the parachute by pulling the ropes on any one side of the parachute, forming a sail of that side of the parachute, so that it would result in the wind carrying the parachute in a given direction. They also found that if they were travelling in a current which was taking them away from the desired landing place, they could pull the ropes on two sides of the parachute, and by decreasing the span of the parachute they caused it to drop faster, thereby getting out of that air current which was taking them in the wrong direction.

"(7) Another important thing which must be given attention is the harness which connects the pilot to the parachute while he is descending. With a good harness the pilot will feel fairly comfortable while descending, and he can detach himself immediately upon touching the ground, so as not to be dragged over the ground by the parachute in the event of there being a strong wind close to the ground."

Besides saving the lives of aviators and air travellers in case of accident, it is expected that parachutes will be used extensively in future to drop mail and packages from aerial mail planes at stations where the planes do not land to get mail.

Towards the close of the war parachutes were used by the Allies to supply ammunition to infantry and machine gunners on the front line, who were cut off from the rest of the fighting forces by German barrage fire. Boxes of ammunition were attached to parachutes, which were dropped over the fighting infantry and machine gunners, who were then enabled to proceed with advances and take important positions which could not have been done otherwise.

CAPTAIN BARTLETT'S ARCTIC EXPEDITION

THE report that a British party commanded by Captain Wild is to start for the North Pole in April, by way of Spitzbergen, was welcomed at the Aero Club of America today by Captain Robert Bartlett, Mr. Alan R. Hawley, president of the Club; Read-Admiral Bradley A. Fiske, Henry Woodhouse, Augustus Post, Major Cushman A. Rice, U. S. A., John Hays Hammond, Jr., Henry A. Wise Wood and Charles Jerome Edwards.

"As there is over one million miles of unexplored regions, there is room for a dozen expeditions," said Captain Bartlett, who is to command the American expedition, being sent out under the auspices of the Aero Club of America.

"As Spitzbergen is many hundred miles from Cape Columbia, where our aeroplane base is to be established," said Captain Bartlett, "it is very likely that the two expeditions would not meet or see each other, unless they went out of their way to meet, which we would be likely to do, because while we explorers like competition, we are also interested in each other's success and will go out of our way to help each other.

"American and British aviators worked together to conquer the Germans; it is quite logical that they should work together to conquer the Arctic from the air."

Mr. Hawley pointed out that the despatch does not state whether Captain Wild's expedition will undertake to do more than to explore part of the Arctic regions.

Capt. Bartlett's expedition has three important missions, as follows:

(1) To fly across the top of the world from Cape Columbia on the American side to Cape Chelyuskin on the Siberian side;

(2) To conduct extensive soundings in the Polar Basin and make a map of the floors of the Polar Basin and collect flora and fauna from the ocean bottom.

(Continued on page 872)

THE NEWS OF THE WEEK

Aeronautic Exposition to be Held in Madison Square Garden in February

An aeronautic exposition under the auspices of the Manufacturers' Aircraft Association will be held in Madison Square Garden, February 27 to March 6, inclusive.

Arrangements for this show were begun some weeks ago, but were delayed by a peculiar situation which developed in Washington, as a result of precautions taken to protect the country during the great war. On January 1, 1918, a proclamation was issued by President Wilson prohibiting the holding of any aeronautical exposition during the period of the war.

A few weeks ago the Manufacturers' Aircraft Association took up with the War Department the matter of co-operation and display, especially with regard to war trophies and certain military features. The War Department manifested a willingness to do all it could, but immediately discovered that the proclamation might stand in the way of complete co-operation. The puzzle was put up to the Judge Advocate General. It was suggested that the President himself in his speech to Congress, November 11, in which he said "The war thus comes to an end," had provided a literal abrogation of the old proclamation. Officers felt, however, that it would be better not to establish any precedent. But by the time the matter was brought to the White House, the President had gone abroad.

The State Department was appealed to with the result that the whole subject was cabled to Paris. In the meantime the State Department prepared a new proclamation rescinding the old order and in due time received authorization as shown in the following statement which was issued at Washington, Dec. 20:

"At the request of the Secretary of War, the President has authorized the issuance of a proclamation revoking the proclamation of last January, prohibiting the exhibition of aircraft during the period of the war. Pending the formal signing of the new proclamation the Secretary of State has requested the Attorney-General not to prosecute any infringement of the earlier proclamation."

Col. Mars Heads Aircraft Production

Washington.—Lieutenant Colonel J. A. Mars has been appointed director of the Bureau of Aircraft Production, taking the place of W. G. Potter, who has resigned as was previously announced. Colonel Mars is a regular army officer.

Bids Asked for Service Equipment

The Salvage Branch of the Supply Section of the Department of Military Aeronautics has invited sealed bids for the following material:

1,000 Standard J-1 aeroplanes, equipped with Curtiss OX5-90 engines, at Houston, Tex.

200 Standard J-1 aeroplanes with Hispano-Suiza 150 h.p. engines, at Houston, Tex.

Standard J-1 aeroplanes, without engines, Houston, Tex.

10 L. W. F. aeroplanes, with Thomas 135 h.p. engines, at St. Paul, Minn.

2,000 A-7-A four-cylinder Hall-Scott engines at Houston, Tex.

The bids for the above materials will be opened at 11 A. M. on February 1, 1919, at the office of the Salvage Branch, Washington, D. C. Each bid must be submitted in duplicate and accompanied by a certified check for 20 per cent of the amount of the bid. The Government will receive proposals for any item or any quantity subject to the usual reservations. The terms of all sales will be cash, f.o.b. location given, and delivery must be made within ninety days.

No More Civilian Flying Instructors

Under date of December 11 the following information and instructions were telegraphed by the Director of Military Aeronautics to all commanding officers of flying fields, aviation repair depots and acceptance parks:

"The Secretary of War has abolished position civilian flying instructor, effective December 31, 1918. On or before December 31, discharge without prejudice all such, quoting authority Secretary of War, first indorsement December 6, and this telegram. You may grant leave up to and including December 31, provided total leave granted does not exceed thirty days current calendar year. Report by letter names those discharged with dates."

Consolidation of Various A. S. Branches

Major-General Charles T. Menohar, who is now en route from France to fill his new appointment as Director of the Air Service. General Menohar commanded the Rainbow Division in France

Announcement is made of the transfer of the Traffic and Storage Branch of the Bureau of Aircraft Production to the Division of Military Aeronautics, and of its consolidation with the Traffic and Storage Branch, Supply Section, D. M. A., of which Col. Clinton G. Edgar is chief.

The seven aircraft production depots operated by the Traffic and Storage Branch, B. A. P., are affected by this transfer. These are located at Detroit, Mich.; Buffalo, N. Y.; Dayton, Ohio; Elizabeth, N. J.; Washington, D. C.; and San Francisco and Sacramento, Cal. The two latter named depots have been closed and the others will hereafter be designated as aviation general supply depots. Other storage arrangements include the following:

To the Aviation General Supply Depot (formerly the Aircraft Production Depot) at Tenth and B streets southwest, Washington, D. C., nel at the Washington Aviation General Supply have been transferred all the stock and person- Depot, 1422 First street northeast, which has been vacated.

The Aircraft Production Supply Officer, who was stationed at Port Newark, N. J., has been eliminated and his work taken over by the Aviation Officer, Port of Embarkation, New York City.

This transfer also involves changes on the traffic side. Traffic offices were maintained by the Bureau of Aircraft Production at New York City, Elizabeth, N. J.; Buffalo, N. Y.; Elyria and Dayton, Ohio; Detroit, Mich.; Chicago, Ill.; Jacksonville, Fla.; and San Francisco, Cal., as well as a main office at Portland, Ore., and several branch offices in different lumber districts in connection with aeroplane spruce production. As a result of the consolidation the Chicago, Elyria and San Francisco offices have heen closed, and the New York and Detroit offices consolidated with the traffic offices maintained in those cities by the Division of Military Aeronautics. The traffic office of the division at Pittsburgh is retained.

All activities of the Spruce Production Division of the Bureau of Aircraft Production have been discontinued.

Intended for eventual transfer to the Division of Military Aeronautics are the whole of the Aeroplane Engineering Division (including Production Engineering, Experimental Engineering and Design), McCook Field, and also the Technical Information Department of the Bureau of Aircraft Production.

In this connection it is also announced that Erie Warehouse No. 2, maintained at Jersey City, N. J., by the Division of Military Aeronautics for the consolidation of overseas shipments, has been closed and that functions of Radio and Photograph Warehouse No. 1, New York City, are being assumed by the Aviation General Supply Depot at Fairfield, Ohio.

It is pointed out that this consolidation and redistribution of functions and the discontinuance of former offices of both the bureau and division make for reduction of expense of operation and economy of administration.

First Trans-Continental Flight

The squadron of four army training planes flying from San Diego, Cal., reached the Atlantic Coast on December 22. This flight in formation approximates 2,400 miles. The planes left the Pacific Coast December 4 and they have come east across the continent in short flights limited hy the size of their gasoline tanks, none of the

A recent photograph of Lt. Meisner and Eddie Rickenbacker, American "Aces", who were awarded Distinguisbed Service Crosses for bravery planes carrying more than an hour and a half's supply at any one time. The crews, two men to a plane, have gathered data and statistics on landing fields, also made air maps of the route along which they came.

This work is a part of the big reconnaissance now being made by fliers going out in all directions from over twenty-five fields in various parts of the country. The material collected, as fast as it is returned to the fields, is being forwarded to Washington for analysis and compiling in the form of a government air guide or blue book. Major Albert D. Smith, commanding the air squadron which has come east from the Pacific, reported on December 23, to the Division of Military Aeronautics in Washington, D. C., that his planes left Americus, Ga., at 9 A.M., December 22, and arrived at Jacksonville, Fla., at noon, having encountered rain and fog all the way and at no time having a ceiling of more than 500 feet. Major Smith expects to fly his squadron north to Washington at an early date.

Personnel Board

A board of officers as named below is constituted to consider such matters affecting the personnel of the Air Service as may be brought before it:

Colonel Archie Miller, A. S. A.
Colonel M. F. Davis, A. S. A.
Colonel William E. Gillmore, A. S. A.
Colonel Henry C. Pratt, J. M. A., A. S. A.
Lieut.-Colonel Rush B. Lincoln, A. S. A.
Lieut.-Colonel B. F. Castle, J. M. A., A. S. A.
Lieut.-Colonel M. F. Harmon, J. M. A., A. S. A.
Lieut.-Colonel H. Benington, A. S. A.

Morrow Field

The following letter from the Adjutant General designates the field at Detroit as Morrow Field:

"You are informed that the Air Service Acceptance Park at Detroit, Mich., will be officially known as Morrow Field, in honor of Lieutenant Karl Clifford Morrow, who lost his life in Detroit, Mich., November 11, 1918, while entertaining citizens of the city who were celebrating the signing of the armistice.

(Signed) RALPH HARRISON,
Adjutant General."

Four Noted Aces Quietly Return

Philadelphia.—Major C. J. Biddle, of this city, one of the famous aces of the American Air Service, surprised his relatives by reaching home without previous announcement on December 21. He was accompanied from France by Lieutenant Colonel William Thaw, of Pittsburgh; Captain Edgar E. Tobin, of San Antonio, and Captain Roy C. Bridgman, of Lake Forest, Ill.

U. S. Airmen Downed 854 Enemy Planes

Washington. — American airmen in France brought down a total of 854 German aeroplanes and 82 German balloons, against an American loss of 271 planes and 45 balloons, according to a report cabled by Major General Harbord, made public on December 22 by the War Department. Destruction of 354 of the enemy planes and 57 of the balloons had been officially confirmed.

The total casualties of the American Air Service in action are given as 442, including 109 killed, 103 wounded, 200 missing, 27 prisoners and 3 interned.

When the armistice ended the fighting, the report said, there were 39 American aero squadrons at the front. They included 20 pursuit, 6 day and 1 night bombardment squadrons and 5 army, 12 corps and 1 night observation squadrons. The total personnel was 2,161 officers and 22,351 men at the front, with an additional 4,643 officers and 28,353 men in the service of supply.

Col. Thurman Harris Bane, one of the few J. M. A.'s in the army who is in charge of the Technical Section, Department of Military Aeronautics

Eight American flying officers were detailed with the British army and 49 officers and 525 men with the French forces.

The total strength of the American Air Service in France was 58,090, of whom 6,861 were officers. This was exclusive of the air service mechanics' regiment with the French army, numbering 109 officers and 4,744 men. In addition to these trained men, the air service had eight separate schools in France, where 1,323 pilots and 2,012 observers were under instruction, and graduations up to November 11 included 6,069 pilots and 2,045 observers.

Up to November 16 General Harbord reported, 6,472 planes of all types had been received by the American Air Service in France, including 3,337 pursuit planes for combat work and ninety for schools; 3,421 observation for service and 664 for schools, 421 day bombers, with eighty-five additional for schools, and thirty-one night reconnaissance machines. There were in addition 2,285 training, thirty experimental and 108 miscellaneous machines.

The eight American air schools in France had a capacity for training 3,800 officers and 11,700 men. The largest was the general flying school at Issoudun, where 2,175 officers and 6,100 men could be cared for. The others were at Tours and Chatillon-sur-Seine for observers, at Maucon and Coetquidan and Souge for artillery fire spotters, at St. Jean de Monte for aerial gunnery and at Clermont-Ferrand for bombers.

Lieut. O'Brian Hopes to Make Trans-Atlantic Flight

Kankakee, Ill.—Lieut. Patrick O'Brian, American aviator in British service, whose escape from German captors formed a romantic chapter in the story of the war, announced that he will attempt to be the first to make a Trans-Atlantic flight in an aeroplane. He hoped to make the flight in April.

Capt. I. F. Fuller, an American aviator still on duty in France, and Lieut. C. C. Robinson, an American who was one of O'Brian's comrades in the British Flying Corps, will be associated with him in the venture.

Goodyear Balloon S-11 Makes Record

Balloon S-11, from Wingfoot Lake, recently completed a remarkable trip from the local flying field to Wbeatley, Ontario, Canada.

The balloon, piloted by a former Goodyear man, Walter W. Morton, was the third and smallest balloon to make the trip over Lake Erie, a distance of 140 miles.

The trip was completed in two hours and fifteen minutes and the height of 1,500 feet maintained throughout.

Morton was accompanied by C. O. Brown and R. S. Stebhins of the Naval Aviation Service.

Morton was formerly connected with the Balloon Department here, and has been interested in this branch of flying for a number of years.

Rodman Wanamaker Now Colonel

Rodman Wanamaker, Special Deputy Police Commissioner, is now a Colonel on the staff of Governor Alfred E. Smith. His name was one of four announced for the staff by Mr. Smith, the others being Capt. Tracy Hammond Lewis of Great Neck, L. I., a son of William E. Lewis, editor of the *Morning Telegraph;* Lieut. Joseph F. Sabine Meecham of Syracuse and Lieut. Ernest E. Malcomb of this city.

Col. Wanamaker is credited to the infantry branch of the service. Capt. Lewis has just returned from Fort Sill, where he was an instructor in the balloon branch of the army. Lieut. Meecham has been in the Quartermaster's Department and Lieut. Malcomb was an aide to Brig.-Gen. George R. Dyer.

Air Service Detachments Ordered Home

Fourteen Air Service units of different branches of the service have been assigned early convoy back to the United States, according to a statement issued by the War Department on December 26.

The 19th, 30th, 23d, 20th, 36th, 35th and 45th Balloon Companies are listed to sail for the United States shortly.

Aero Squadrons numbers 19, 1099, 466, 480, 481, and 493 have received their embarkation orders. The 6th company of the 2d Air Service Mechanics regiment has also received its convoy assignment.

"Hobey" Baker Dead

Paris.—Hobey Baker, the famous Princeton hockey star and an aviator in the American army, was accidentally killed while flying on December 21.

The fatal flight was the last Baker was to have made before leaving for the United States, papers ordering the airman to return to America being found in his packet when his body was picked up.

Baker will be buried in France, beside two other famous American aviators—Lufberry and Putnam.

H. A. H. ("Hobey") Baker was famous in eastern amateur and college athletic circles for his football and hockey playing. He easily made the Princeton 'varsity eleven, and was a member of the backfield from 1911 to 1913, as well as captain of the team in his senior year. He was also captain and a prominent factor in many of the victories of the Princeton hockey team.

Front view of the De Havilland-4 with a 400 H.P. Liberty "12" Engine, constructed by the Standard Aircraft Corporation

The AIRCRAFT TRADE REVIEW

N. E. J.

Line of Zeppelins to America Planned

Paris, Dec. 26, (Havas.)—Disarmed German Zeppelins will be converted into aerial merchantmen to ply between New York and Hamburg, according to the *Echo de Paris,* which says that it has received its information from "reliable sources."

Alan R. Hawley, President of the Aero Club of America, considers the announced project for converting Zeppelins into merchant carriers to be both feasible and practical.

"We have been reliably informed that large super-Zeppelin type, rigid dirigibles have been constructed which will contain 3,000,000 cubic feet of gas, and have five motors and a length approximately 800 feet," said Mr. Hawley. "These Zeppelins can remain in the air for two weeks without appreciable loss of gas, and can make seventy to eighty miles an hour.

"It has been reported that Zeppelins flew from Jamboli in Bulgaria to Khartum in the Soudan and return, a distance of more than 3,000 miles, carrying a crew of twenty-two men and twenty-five tons of munitions and medicine, intended for the relief of General Lettow-Vorbeck in German East Africa. When over Khartum a wireless was received by the commander of the dirigible that the German officer had been captured, and it turned back without landing."

U. S. Dirigible Sets Record

New York.—What is declared to be a new world's record endurance flight in a non-rigid dirigible balloon—32 hours before a landing was made—will be submitted by the United States naval air station at Key West, Fla., to the Aero Club of American for homologation. Before it can be officially recognized as a record it must be so declared by the Aero Club of America, it was explained, under the rules of the International Aeronautic Federation, of which the American organization is a member.

The flight claimed as a record was made on November 23 by Ensign Thomas E. Haytham, of Buffalo, N. Y., accompanied by Ensign Tulford B. Null, of Denver, Colo., and J. H. Collier. The airship carried a full load, consisting of radio apparatus, anchors, rations and other necessary accessories. The motor was run continuously at cruising speed, and about 600 miles had been flown before a leak and a threatening storm compelled a landing.

Frank H. Russell, president of the Manufacturers' Aircraft Association, who has just been appointed General Manager of the Curtiss Engineering Corporation at Garden City

Cato With Marlin-Rockwell Corporation

J. L. Cato, experimental engineer at the plant of L. W. F. Engineering Company, who developed the L. W. F. Model "G" has resigned to develop for the Marlin-Rockwell Corporation a new all ball bearing aeronautical motor, which later will power a sporting type of monoplane of his own design. Mr. Cato has been connected with aeronautical work since 1909, and with his long experience he should bring out a popular type of sporting plane.

Browning Gun Perfected

Ogden, Utah.—Perfection by John M. Browning of machine guns for aeroplanes so that a flier can, by pressing one trigger, fire three machine guns simultaneously, shooting 3,600 shots a minute at the same target, was announced Dec. 20 upon the return of the inventor from the east.

Uses Parachute in Leap from Plane

Dayton.—Test of a parachute equipment as a protection in air navigation was made at the Wilbur Wright aviation field here December 20 with Rodman Law in the stellar role. He has been experimenting for six weeks along this line using sand bags attached to a parachute to demonstrate how an aviator may jump from a crippled aeroplane and land safely. The parachute weighs 12 pounds and is made of Japanese silk. Army officials watched the first test in which Law leaped from the aeroplane with the parachute.

Aerial Transport Co. In Canada

Aeroplanes are to supplant ferryboats in transporting passengers from Prince Edward Island to the mainland, it has been announced by Major Kennedy, of the Aircraft Manufacturing Company. The Prince Edward Island Aerial Transportation Company has been formed with a capital of $250,000 to carry on the new service.

c "The aeroplane flight between Charlottetown, on Prince Edward Island, to Montreal, on the mainland, a distance of about 100 miles, will be made in an hour and a quarter," said Major Kennedy. "The West Indies Aerial Transport Syndicate is already operating one plane between all the islands of the West Indies."

Air Fete Over Fleet In Hudson

New York, Dec. 27.—Fifteen large seaplanes and two dirigibles from the naval air station at Rockaway manned by members of the naval air service left Rockaway station shortly before 9 o'clock, flew over the lower bay and circled over the fleet now anchored in the Hudson. The first half dozen were in battle formation, the others flying singly. This is the air squadron that was to meet the fleet Thursday, December 26, but as a result of unfavorable weather conditions, it did not take part in the ceremonies.

After the squadron had circled over the fleet at its farthest northern point, it flew back and forth over the Hudson all the morning.

One of the vessels, the U. S. S. Texas, carries 3 aeroplanes, 2 Sopwiths and a French bombing plane which were taken aboard at Brest, France.

This book was presented to President Mingle of the Standard Aircraft Corporation. It is a complete photographic and written record of "Langley Day" when the first American built Handley Page was launched at Elizabeth, N. J., in July

Hon. Albert S. Burleson, Postmaster General
Hon. Otto Praeger, Second Assistant Postmaster General
L. T. Bussler, Chief of Maintenance and Equipment
J. Clark Edgerton, Chief of Flying Operations

US
AERIAL MAIL

PILOTS

Ira O. Biffle
Irving Graeh
Trent C. Fry
Leon D. Smith
L. V. Smith
Dunn K. Steele
Lyman W. Doty
Carroll C. Eversole
Dan Davison
Dana C. DeHart
Edwin W. Huhhard
D. I. Lamh

George Langley Conner, Chief Clerk to Second Assistant Postmaster Praeger
Charles M. Kight, Special Representative
John A. Jordan, Special Representative
Louis T. Bussler, Special Representative
Geo. R. Bowie, College Park, Md., Representative
H. Thomas, Belmont Park, L. I., N. Y., Representative
R. Smith, Bustleton, Penn., Representative

AVIATOR-MECHANICS

Christopher C. Cole
Julian Sykes
Wm. L. Lindley
August E. Carlson

Boston to Chicago Air Mail Is Next

Washington.—The establishment of an air mail route from Boston to Chicago, with stops at Albany and Buffalo, will be accomplished by the Post Office Department early next summer. Second Assistant Postmaster-General Praeger has determined that the establishment of this important line from the lakes to the coast shall be the next development.

Flying from Boston to Albany represents an air line of 200 miles. The next step of the journey adds practically 300 miles. From Buffalo to Chicago the air line distance is slightly less than 400 miles.

The rate of postage by air mail will be the same as for the established daily service between Washington and New York. The rate as now fixed will remain until the working out of the general use of the system has developed to a point where a reduction is justified.

Mr. Praeger expects that when the Boston-Chicago line is established the actual flying time will be inside an eleven hour limit, inclusive of the two stops.

Aero Mail in Belgium

Aerial mail service for government correspondence has been established in Belgium, according to advice received from Brussels.

Chart New York-Cleveland-Chicago Aero Mail Route

Cleveland, O.—The four aeroplanes which left New York December 28 are not expected to reach Cleveland before December 31. The machines have been flying leisurely in order to chart all possible landing fields between New York and Cleveland.

"Cleveland's aero mail will leave on time January 2, rain, shine or snow, and regardless of whether the mail planes from Chicago and New York reach here on time or not," John A. Jordan, aero mail supervisor, said.

"We will have five aeroplanes in the city Thursday ready to leave with mail for both the East and the West. In the days preceding Thursday we will make every preparation to carry the services through on the opening day."

Three aeroplanes which landed at Ravenna, and Painesville, Ohio, and Sharon, Pa., last week are expected in Cleveland December 31.

Christmas Aerial Mail

The Post Office authorities at Washington at the city office announce that over 27,000 pieces of Christmas mail were delivered at the city office for transport by aerial mail service. This is the largest volume of business that the aerial department has so far transacted in a single day.

Brazil to Have Aero Mail Service

Washington.—Brazil will shortly have an aero mail service between its principal cities. The Government has granted concessions to a corporation allowing it to establish aeroplane mail service between the various capitals of the States of Brazil. Activities will comprise carrying of small parcels of mail, and, with further development of aviation, carrying of passengers. The number of trips and the tariff will be regulated by the Government. All mail matter transported must be properly stamped and postmarked. In time of war the Government may take over the service.

Aero Mail for Chili

Santiago, Chile.—Included in the New Year's festivities here will be a ceremony marking the inauguration of an aerial mail service between Santiago and Valparaiso.

Resume Aero Mail Service to Fleet

Fighting a headwind of forty miles an hour all the way down the Potomac and across Chesapeake Bay, the first mail hydroaeroplane to leave the Anacostia station for a week landed on the storm waves at Hampton Roads, with the official mail for the Atlantic fleet.

This pioneer naval mail service has been interrupted for almost a week by high winds and heavy fogs which have prevailed off the Virginia coast. In the face of threatening weather, the hydroaeroplane at Hampton Roads did not attempt the flight to this city.

It is expected that regular daily service in both directions will be resumed as soon as weather conditions permit. Service will be continued at least until the freezing of the river makes landings impossible.

The consignment of mail carried to the fleet was unusually heavy, being the result of several days' accumulation. It was, for the most part, official matter.

The naval aero mail service between Washington and Hampton Roads was begun on November 16.

Aero Mail Increases 600%

Aero mail has increased 600 per cent during the past month, postoffice officials announced December 20. This is attributed to the mailing of Christmas cards by this novel medium, and also to the rate reduction on one ounce of first-class matter from 16 to 6 cents.

First trip of aerial mail from the Atlantic to the Pacific across the Isthmus of Panama, which was made by Major Walter W. Wynne recently. Major Wynne is shown receiving a pouch from the postmaster at Cristohal, Canal Zone, ready to start for the flight

THE HISPANO-SUIZA ENGINE

(*Concluded from page* 816)

Magneto Mounting

On ALL models two magnetos are used, firing two sets of plugs simultaneously. On Model A the magnetos attach to platforms integral with the upper half of the crankcase and are situated directly behind the cylinder blocks, with their shafts parallel to the crankshaft. On each magneto shaft a bevel pinion is mounted, engaging with a gear attached to the upper end of the lower vertical shaft. That is to say, immediately beneath the screwdriver connection on the camshaft drive.

On Models E and I the two magnetos are mounted crosswise of the engine on a special bracket bolted to the rear end of the crankcase, and this bracket incloses a spiral gear. The upper member of this gear has a short transverse shaft on each end of which the magneto couplings are mounted, and this runs in ball bearings housed in the aluminum of the bracket. The couplings float, that is, they allow for sufficient universal joint motion. The lower of the spiral gear pair has a shaft of which one end is set in a ball bearing in the bracket while the other end has a tongue which engages with the slot in the end of the crankshaft.

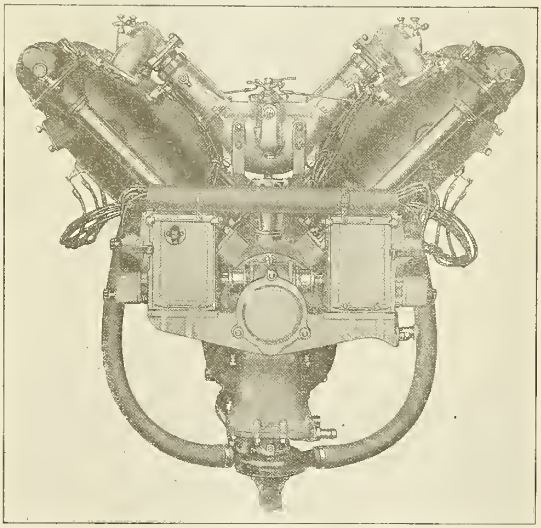
This design enables the magnetos to be detached more readily, since they are driven by couplings of an easily detachable nature. It should also be noticed that on Model A both magnetos are the same and operate with left hand rotation, while on the other models one is arranged for right hand and the other for left hand, as they face apart, but are driven by one shaft.

Pistons and Connecting Rods

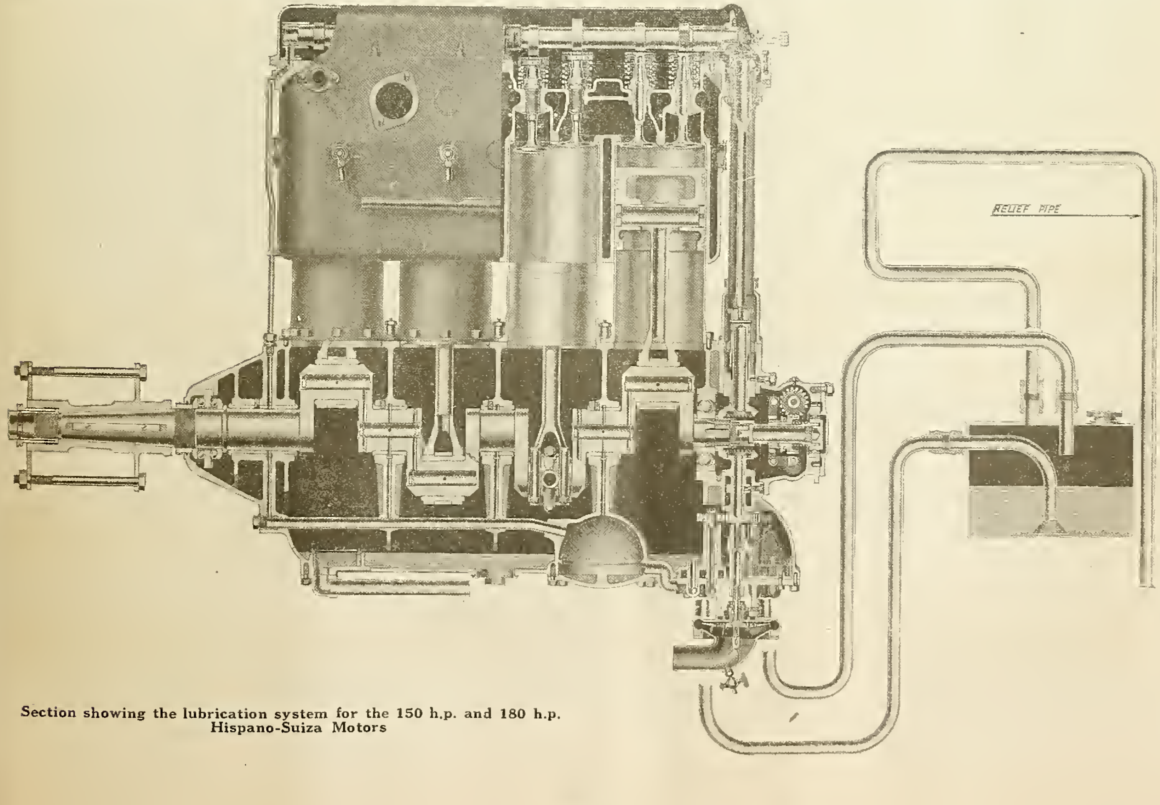
For all models the pistons are aluminum and the connecting rods of round section completely drilled out for lightness, but the detail is different. Model A pistons are webbed beneath the heads and the wrist pins are fixed, being secured by a set screw which passes completely through the wrist pin and piston boss, being itself locked by a cotter. Each piston carries four compression rings which are very narrow and fit in two grooves, while there is also an oil scraper ring near the bottom of the skirt.

Models E and I pistons are identical in form, except that the Model E is of different dimensions, so as to give the increased compression. These pistons have no ribbing beneath the head, the head itself being very thick. The wrist pins float, that is, they are free to turn in the piston bosses as well as in the small ends of the connecting rods. They are prevented from endwise movement by means of a special ring which encircles the piston on the centerline of the wrist pin.

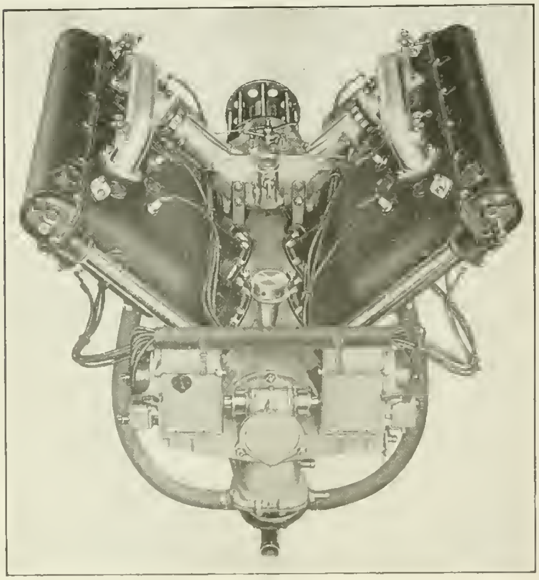
Model A connecting rods consist of an inner rod and an outer. The inner has a lower end which is split like the conventional design of rod, the cap being held on by two bolts. The lower end and cap are not only bored and babbitted on the inside to fit the crankpin, but are also turned and babbitted on the outside, the center portion where the bolts come being kept very narrow. The outer rod is forked, and consequently



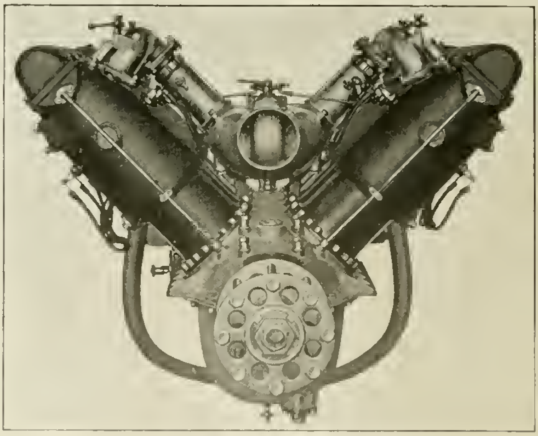
Pump end of the Hispano-Suiza, showing cross driven magneto



Section showing the lubrication system for the 150 h.p. and 180 h.p. Hispano-Suiza Motors



3 Semi plan view of 300 h.p. Hispano



Note small total height of 300 h.p. in end view

has the equivalent of two caps joined together by a sort of bridge. It encircles the inner rod, taking its bearing on the external babbitted portion of the inner rod.

While this construction is extremely light, it is very difficult to make, and the process of babbitting the inner rod is far from easy. Special tools are required for boring the inner babbitt and insuring that the outer babbitt is perfectly concentric with the inner. It is a job which cannot be undertaken without special equipment.

On Models E and I the intricate lower end is replaced by a diecast bronze box of what is called the "marine type." This is lined with babbitt and fits the crankpin. The forked connecting rod terminates in two flat feet and attaches to the bronze box by four bolts which also hold together the two halves of the box, the latter being split in the conventional way.

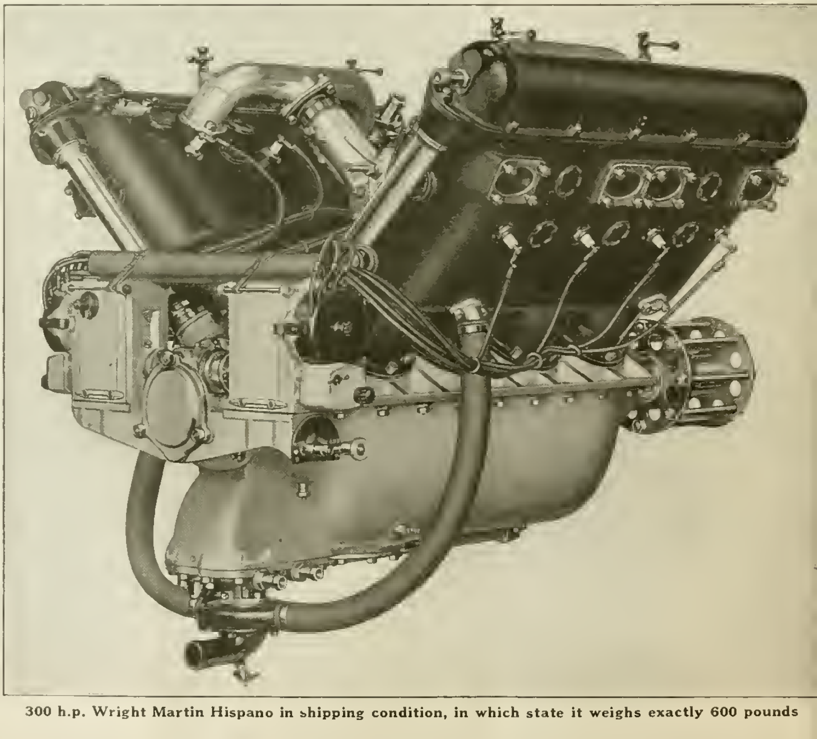
The outside of the bronze in the space between the two feet of the forked rod is turned and forms the bearing for the other connecting rod lower end, this being split in the conventional way and held together by two bolts. This design allows for the fitting of a new set of bearings with ordinary tools and methods. Also the bronze being a very good conductor helps to dissipate the heat produced by the friction.

Oil Pump Lubrication System

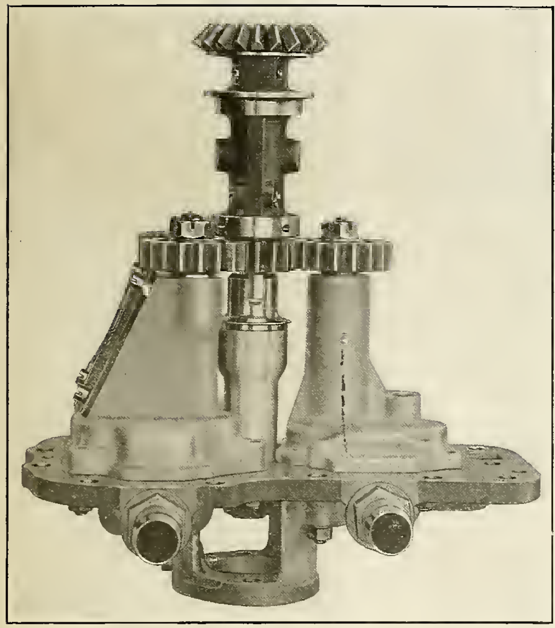
There is one main oil channel, this being a steel tube cast in the lower half of the crankcase, in which the oil pump is located, as already described. From this main channel oil passes to the four main bearing bushings. Each bush is encircled by a groove cut in the aluminum, which is thus kept full of oil. Passing through holes in the bushing oil reaches the crankshaft, and passing on through holes in the shaft completely fills the inside thereof, passing out again through other holes which lead to the lower ends of the connecting rods; further holes in the inner connecting rod members leading oil to the outer rod bearing. Piston and wrist pin lubrication is performed by the oil spray exuding from all bearings.

Camshaft and valve lubrication is obtained by taking oil from the groove around the front end main bearing and leading it up through two small steel pipes, one attached to each cylinder block. These lead to holes in the aluminum, registering with holes in the front end camshaft bearings. Thence the oil enters the camshaft itself, which is hollow from end to end, and small holes drilled in each cam allow lubricant to be discharged directly upon the tappets These holes are on the opening face of the cam and so oil the tappet head just as the cam begins to lift. The excess not only lubricates the valves themselves, but flows into the bearing supporting the upper vertical shaft. Here it obtains access to the space inside the tube inclosing the vertical shaft falls down this, lubricates the lower vertical shaft bearings and returns to the crankcase through the hole drilled right through the lower vertical shaft. Every bearing and gear is thus taken care of in proportion to its requirements.

Here occurs another difference between the models. Mode A *can* be used with the whole supply of oil contained in the sump, the oil pump sucking from the middle of the sump through another steel tube fixed in the crankcase, but this is very poor practice. Oil on returning to the crankcase should be allowed to run out of the bottom, into an oil radiator placed well beneath in a good air draft, whence it is drawn by the pump.



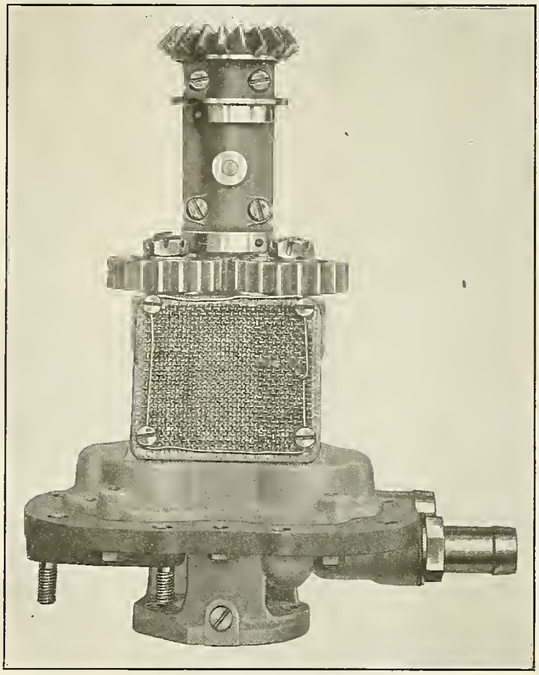
300 h.p. Wright Martin Hispano in shipping condition, in which state it weighs exactly 600 pounds



Complete oil pump assembly for 300 h.p.

On Models E and I there is a second oil pump supplied for the express purpose of keeping the crankcase empty. This is a gear pump attached to the rear of the magneto bracket, taking its drive from the rear end of the magneto shaft. This sucks from the crankcase and forces the oil through the oil radiator to a tank which is mounted on the plane, preferably in some position where it will be kept cool by air draft. The force pump then draws its supply from this tank, getting oil which is well cooled. In aeroplane engines the duty of the oil is not only to lubricate the bearings, but also to carry heat away from them, thus it is important to provide for ample cooling of the oil.

On all three models the pressure oil pump is the same. It consists of a shaft having a slot cut in it in which fit a pair of bronze vanes forced apart by springs. This shaft passes through a hole in the pump body which is eccentric with the shaft. The hole is of the same length as the vanes and the springs hold the vanes pressed tightly against the sides of the hole.

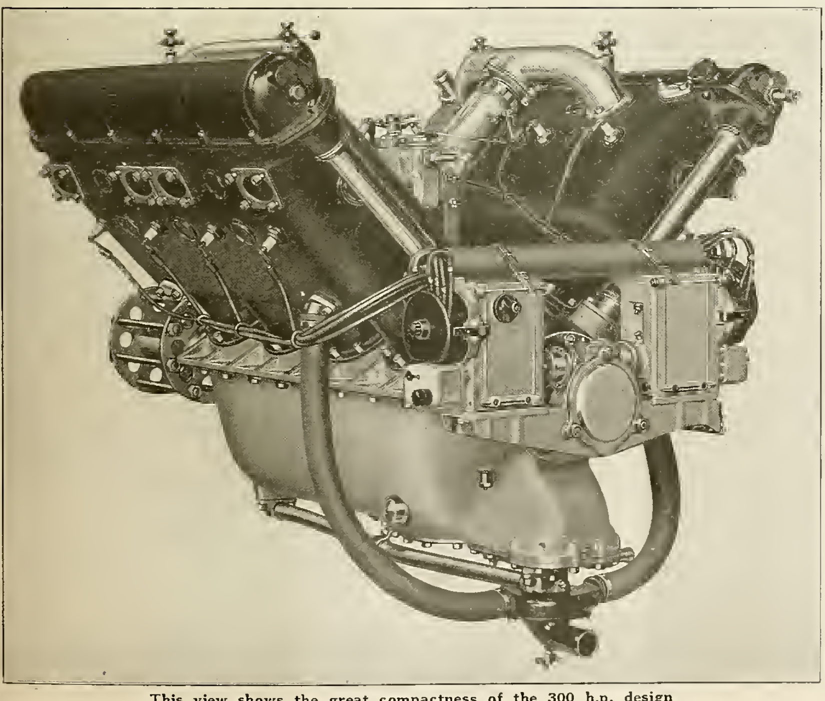


Oil screen on intake of pump

Owing to the eccentricity, as the shaft turns the vanes slide in their slot at the same time that they are being revolved. Suppose now we think of the section of the pump when the shaft is in such a position with respect to the hole in the body that the vanes are truly central, projecting equally on either side of their slot. Then, because of the eccentricity, the space between the shaft and the body on one side of the vanes will be greater than that on the other side.

On the side with the larger space there are holes in the pump body connecting with the suction line, while on the opposite side are holes leading to the pressure lines. As the shaft turns the oil contained on the large side is swept round and compressed into the smaller space on the other side, the process repeating itself twice each revolution.

There is an oil screen between the pressure outlet of the pump and the entrance to the oil supply channel, this screen being screwed into a cavity in the crankcase whence it can readily be removed for cleaning.



This view shows the great compactness of the 300 h.p. design

Water System

The water pump is a simple centrifugal type with two outlets. It is placed directly beneath the oil pump, attached to the crankcase through the medium of a bronze bracket. The lower end of the oil pump shaft is carried out through the crankcase and is furnished with a square hole. Into this hole the squared end of the water pump shaft fits, there being two packing glands, one to prevent escape of oil downward and the other the conventional gland to retain the water. The pump delivers through two pipes, rubber in some installations and in others copper, to the lower, outside rear corners of the cylinder blocks. From these it passes out to the radiator through two pipes attached to the upper, inside front and corners of the jackets.

Carburetion

Two types of carburetor are used, the Zenith, which is found on all the older engines, and the Stromberg, adopted in the early Summer of 1918. There are two intake flanges on each cylinder block connected together by cast aluminum pipes, and these lie close against the blocks. Above the carburetor there is another aluminum casting having two side outlets and two underneath. To the latter the two outlets of the duplex carburetor connect the side outlets attaching to the center of each intake branch. On one side the connection is by a flange bolting solidly in place, and on the other side there is a short intermediate piece provided with a gland, allowing for expansion. This center casting has a water jacket. This layout with the double form of carburetor is equivalent to two separate carburetors and intake systems, one for each block.

Details

In most aeroplane installations gasoline is fed to the carburetor by air pressure. For this purpose the left hand valve cover carries a small air pump which comprises a bronze cylinder and a piston with a cup leather. The piston is driven from the rearmost exhaust cam, its suction stroke being given by a spring that is compressed on the working stroke of the pump. The pump is not adjustable and supplies air at a higher degree of compression than is ever likely to be required. Various regualting devices for controlling the pressure in the fuel tank are in use, but these are not part of the motor.

The rear end of each valve cover is provided with a threaded boss, and each camshaft has a screwdriver slot in the rear end. In all installations a tachometer or motor speed indicator is used and the flexible shaft for driving this instrument is attached to a special connection supplied with the motor. This consists of a short brass body, screwing in a boss on the valve cover and containing a short shaft meshing with the camshaft slot and arranged at the outer end to take the standard form of flexible shaft connection.

Normally no accessory is driven from the other camshaft and the hole in the end of the valve cover is plugged, but it is always available for driving another accessory.

On some installations, especially naval planes, a starting crank is attached. In the Model A this replaces the cover usually found on the rear end of the crankcase. The hand starting crank usually has geared to it a small magneto which supplies extra current for starting.

The propeller hub which fits on the taper at the front end of the crankshaft is not an interchangeable part in the ordinary sense of the word. Each hub is lapped by hand till it is a perfect fit on the taper and the key only performs part of the function of taking the drive, since the hub is drawn very tightly on the shaft. If the hub is not a perfect fit too much stress comes on the key and the hub is liable to "work" on the shaft. This will tear the shaft and hub and perhaps make it impossible ever to remove the hub. The nuts used for locking the hub in place differ. On Model A there is a single nut with a coarse internal thread screwing on the crankshaft and a fine external thread, screwing into the boss of the hub. This nut screws on the shaft faster than it screws into the hub, so that the hub is pushed onto the taper with considerable pressure. The reverse of this action, of course, assists the removal of the hub.

On Models E and I there are two nuts which are the equivalent of the single nut of Model A. That part screwing into the hub is free to turn on the outside of the nut screwing onto the shaft. In this instance the hub is pushed on by screwing up the inner nut and then finally locked home by the outer nut.

The 300 H. P. Engines

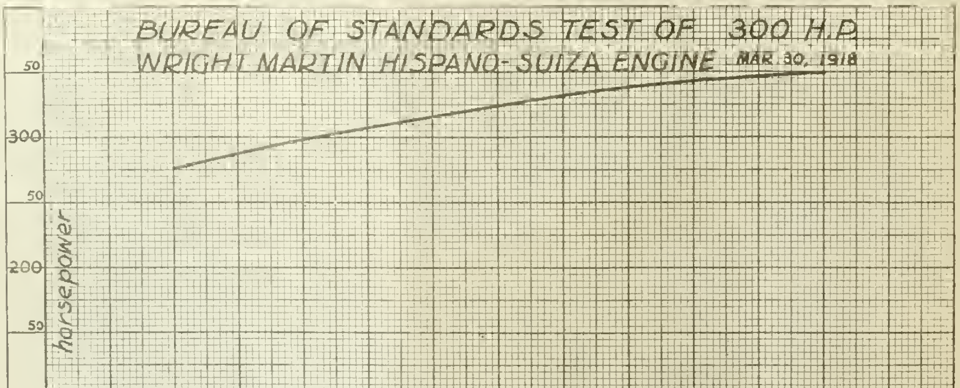
The French 300 h.p. motor is very similar to the original French 150 h.p. except that it has the magnetos arranged crosswise precisely as on the American models E and I. It has bore and stroke 140 by 150 mm. and the average power developed is about 290 h.p. at 1,600 r.p.m.

The Wright-Martin 300 h.p. differs in three salient respects. Firstly it has the Crane design of connecting rod, using marine type lower ends, as in the other Wright-Martin motors. Secondly the lubrication system is altered, the vane pump being abandoned in favor of a gear pump. Thirdly the cylinder sleeves are 30 mm. longer and there is more water space in that portion of the jacket which comes above the valves, and the valve lift is 2 mm. greater.

Due to this last feature, and also to the valve timing, it is possible to obtain a very high mean effective pressure and to maintain this for long periods because the valves do not overheat. Water is carried down very close to the valve seats in sufficient quantity to prevent excessive local heating. On the official test at the Bureau of Standards, Washington, D. C., this engine developed 315 h.p. at 1,600 r.p.m., which is equivalent to a m.e.p. of 139 pounds per square inch, and at 2,000 r.p.m. nearly 360 h.p. was obtained. Repeated tests with different motors have shown that 310 h.p. at 1,600 can be maintained indefinitely without overstressing any part of the engine. In the air it has been operated at speeds in excess of 1,700 r.p.m., delivering nearly 350 h.p.; also for long periods continuously.

The weight of the motor complete with carbureter and magnetos is just 600 pounds, equivalent to one and five-sevenths pounds per h.p. A graph showing the official power curve obtained by the Bureau of Standards is given below.

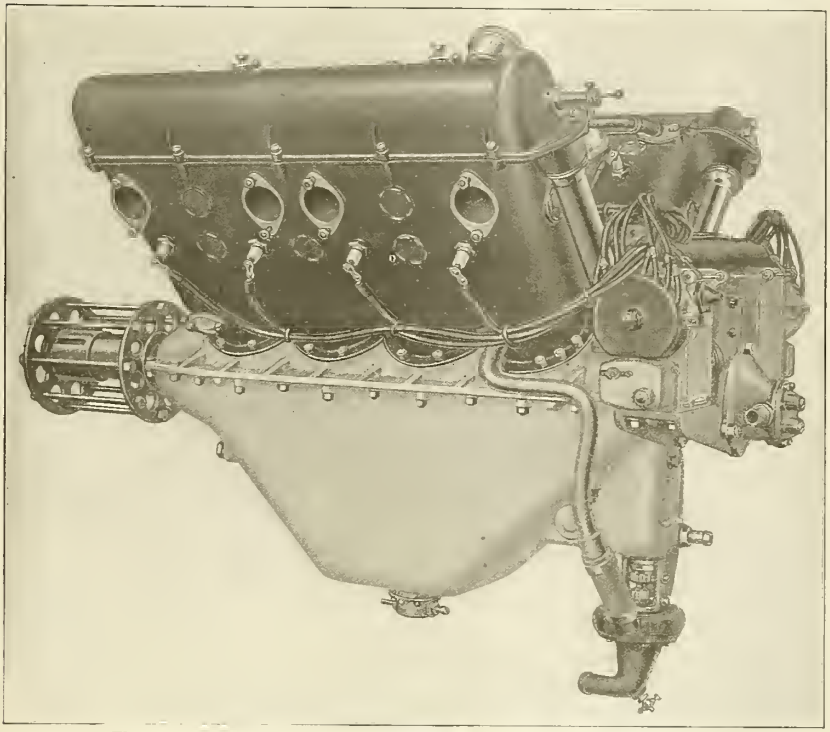
The purpose of making the cylinders longer was largely to do away with the overrun of the pistons. In the French design the pistons come well out of the cylinders at the bottom of the stroke, and thus get deluged with oil. In the Wright-



Martin motor the pistons are always completely within the sleeves and as a result the oil consumption came out only two-thirds that of the French. Actually it is five quarts per hour when operating at full power.

The reason for changing the oil pump design was partly that the gear pumps are a little easier to manufacture, but the principal object was to make a pump which would have no wearing part. Further, the gear pump is so arranged that it sucks from both ends of the crankcase, and the case is thus able to be kept shallow. The engine operates with a dry case, all oil being immediately sucked out of the lower half as it drops from above and pumped to the tank. Inclination of the motor makes no difference, since if the suction port at one end of the case is uncovered, that at the other is submerged.

After being drawn from the case, the pumps force the hot oil through an oil radiator and into a tank, or else direct into a tank, which is so exposed as to act as a radiator. In the new Loening plane, for example, the tank is of narrow section and is placed outside and close against the fuselage, where it obtains ample cooling. However, in any case, oil is taken from the tank by another gear pump and forced to the bearings, the circulation from that point being the same as for the other sizes of motors.



Three-quarter rear view of the complete E or I Hispano-Suiza motor

In the whole oil pump assembly there are three pumps. One, the force pump, is a separate and complete unit; two are the suction pumps for keeping the case dry. One is connected to the front end of the case by an external pipe, the other takes its supply direct through a hole in the pump body. Each pump, of course, has to have a pair of gears, but the three are arranged so that the middle gear wheel serves as one-half for each of the two, thus saving weight and increasing simplicity.

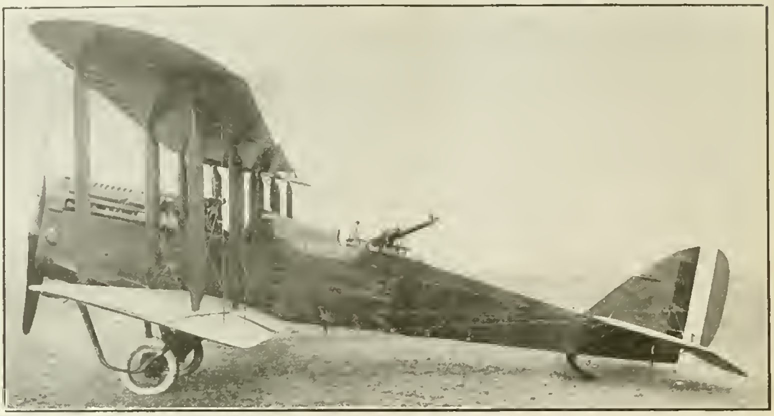
The oil straining is performed on the outlet side of the force pump, there being a very large screen of hemispherical shape located within a chamber cast in the lower crankcase half. This strainer is held in place by a cover and can readily be removed.

Originally the piston of the French motor was similar to the old Model A, with deep webs beneath the head and a fixed wrist pin, the Wright-Martin engine having a simpler piston with a thick head and no ribs, and also a floating wrist pin. This type was later taken up by the French and is the design which was put into European production.

Many experiments have been tried with piston rings and the results show that the four narrow rings generally give better results than two wide ones, but the narrow rings have some drawbacks, so the American 300 h.p. piston is provided with three comparatively wide rings, each in its own groove. There is a scraper ring near the bottom of the skirt, and the piston pin is held from endwise motion by aluminum end pieces. These fit in the pistons, being prevented from turning by tongues, engaging slots cut in the piston itself. In the French design the piston pin is secured by a ring passing across its ends, just as for the American Models E and I.

The Curtiss "NC-1" Type Flying Boat, one of the Largest Navy Flying Boats

THE DE HAVILLAND 4, WITH LIBERTY '12' ENGINE



THE de Havilland 4 with the Liberty engine has been one of the successful associations with America's air program. For reconnaissance and bombing the British have used the de Havilland 4 with a 300 H.P. Rolls-Royce engine, and the adoption of the Liberty 12 has given the United States superior results in both performance and production.

The data and drawings given here are from the de Havilland 4 built by the Standard Aero Corporation, Elizabeth, N. J.

With slight modifications in its equipment, the de Havilland 4 is used for reconnaissance, bomb dropping and fighting. Complete night flying equipment is installed, consisting of green and red port and starboard electric lights near the ends of the lower plane, a rear white light on the deck just aft of the gunner's ring, and wing tip flare lights near the wing tip skids.

Current for lighting and wireless is supplied by two generators attached to the inner sides of front landing gear struts. A camera is clamped to a padded rock on the interior of the body aft of the gunner's ring, where it is conveniently operated by the observer. Dual control is installed, and control stick is quickly detached and removed by pressing a spring catch when it is not necessary for the observer to take control.

Racks are provided for twelve bombs which are held in place horizontally under the lower planes, near the body. The release is accomplished from the pilot's cockpit by means of bowden cable. A sighting arrangement is built into the body just behind the rudder bar.

Four machine guns are installed. Two fixed Browning guns are mounted on the cowling forward of the pilot, operated by the "C. C." automatic interrupter gear or the Nelson direct mechanism, which releases the trigger at each revolution of the engine crankshaft. Two movable Lewis guns are carried on a rotatable Scarff ring surrounding the rear cockpit.

A telescopic sight is provided for the two fixed forward guns and a ring and bead sight for the twin Lewis guns.

Instruments carried are: Two gasoline pressure indicators, speed indicator, tachometer, altimeter, thermometer, clock, hand pressure pump, inclinometer, map board, and compass.

General Dimensions

	Feet
Span, upper plane	42.3
Span, lower plane	42.3
Chord, both planes	5.47
Gap between planes	6.0
Stagger	12.6
Length over all	29.7
Height over all	10.85

Areas

	Square feet
Upper plane	216
Lower plane	205
Ailerons (2 upper and 2 lower)	76
Total wing area with ailerons	421
Stabilizer	33.7
Elevator	23.3
Fin	5.1
Rudder	12.5

Weights, General

	Pounds
Machine empty	2,440
Fuel and oil	452
Military load	848
Total, machine loaded	3,740
Estimated useful load	1,300

Weights, Machine Empty

	Pounds
Engine	858
Exhaust pipes	33
Radiator and water	170
Propeller	92
Gasoline tanks	62
Oil tank	10
Engine accessories, leads, etc	43
Fuselage with cowl	388
Tail plane, incidence gear	6
Body accessories, seats, etc	18
Undercarriage	119
Tail skid	11
Controls	21
Wings	460
Bracing	68
Armament supports	88
Total	2,440

Military Load

	Pounds
Crew	330
Armament	163
Bombs and gears	322
Photographic outfit	22
Wireless equipment	11
Total	848

Performances

Height (feet)	Speed (m.p.h.)	Time of Climb (min.)	Rate of Climb (ft. per min.)
0	128	0	1,330
5,000	126	4.6	1,020
10,000	124	11.6	710
15,000	120	20.5	400
20,000	105		

Main Planes

There is no sweepback, but upper and lower planes are attached to a center section and the body, respectively, at a dihedral angle of 174°.

Aspect ratio of both planes, 7.7. Angle of incidence, 3°.

Fuselage

Veneer is used for covering the fuselage from the radiator to the gunner's cockpit, and no diagonal bracing is therefore employed in this part.

The rear end of the body is constructed in the usual girder fashion, and the longerons, of spruce, are spliced. Veneer is used underneath the tail plane for covering the body.

Tail Plane

Attachment of the tail plane is such that its inclination can be varied from the pilot's cockpit during flight. Its front edge is hinged and the rear end braced by wires attached to a vertical post in the fin. By means of a cable wrapped around a drum and worm at the lower end of the post the rear brace wires are raised or lowered, and the trailing edge of the stabilizer is correspondingly raised or lowered, permitting the setting to be adjustable within the limits of −2° and +5°.

Engine Group

Drawings and a description of the Liberty Motor appeared in the December 1st issue of AERIAL AGE.

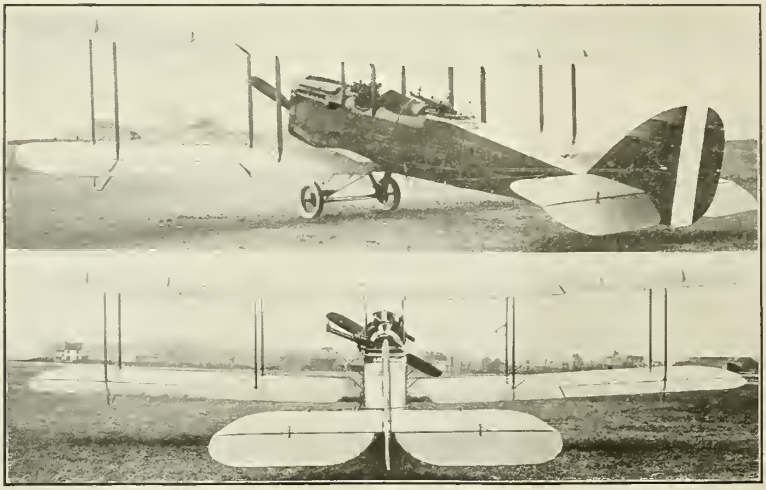
The engine is a twelve-cylinder Liberty "12" which develops 400 H.P. at 1,625 r.p.m. Bore and stroke 5 by 7 inches. Cylinders are set at a 45° V.

Zenith carburetor and Delco ignition are used.

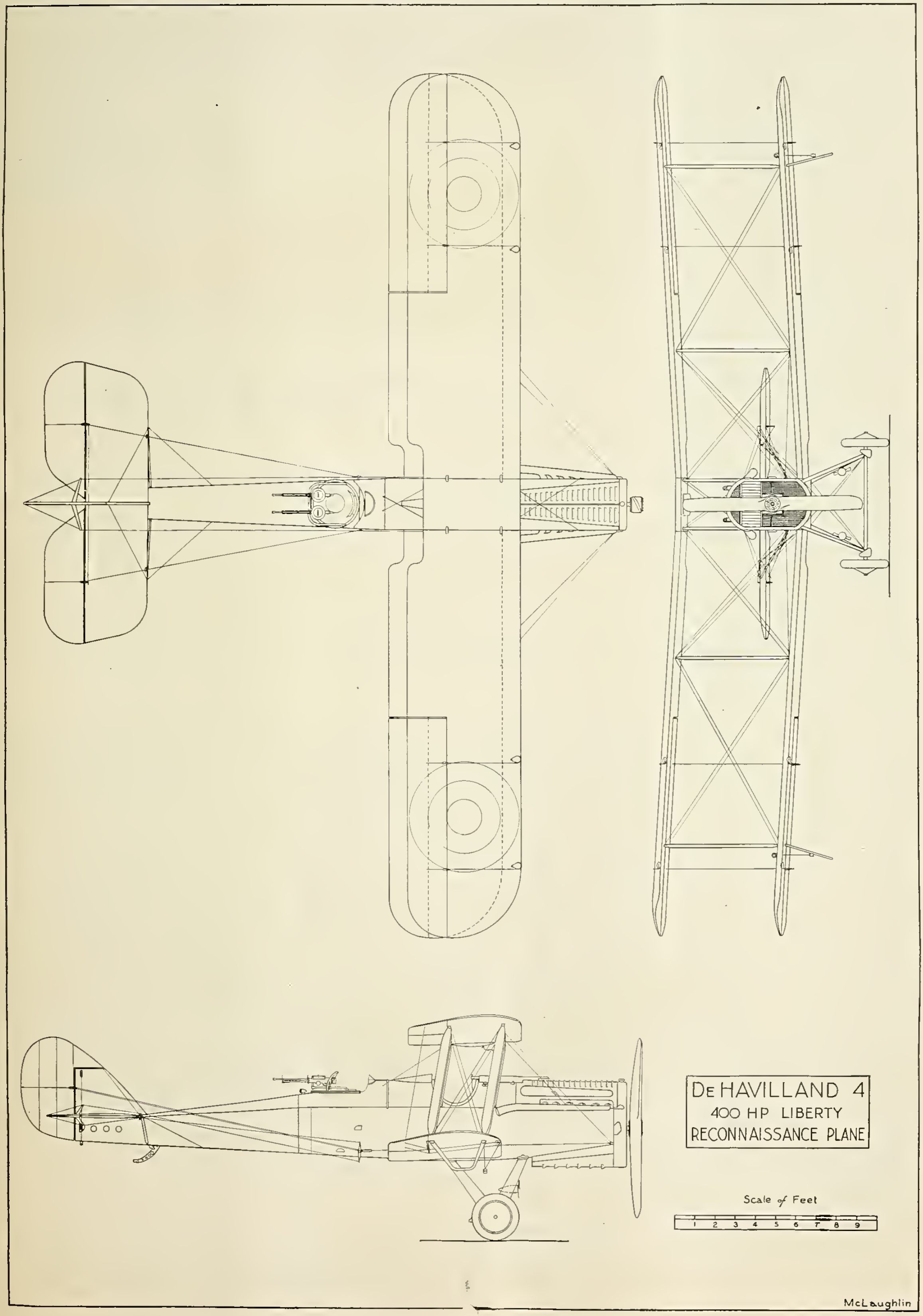
Fuel consumption .54 lbs., and oil .03 lbs. per h.p. per hour. Fuel tanks are located at the center of gravity. Capacity 67.6 gallons. Oil tanks under pilot's seat have a capacity of 5.6 gallons.

The radiator is provided with shutters operated from the pilot's cockpit, to cut off part of the cooling surface when flying at low temperature.

Propeller, 8.6′ diameter and 10.7′ pitch. When at rest on the ground the propeller hub is 6′ 0″ above ground, and in flying position it is 5′ 0″ above ground.



Rear views of the DeHavilland 4 built by the Standard Aero Corporation



DE HAVILLAND 4
400 HP LIBERTY
RECONNAISSANCE PLANE

"THE OP

Curtiss Achievements

1—The design and construction of the fastest fighting airplane ever flown. Of
Government records credit this triplane, which was built for the U. S. N
known as model 18-T, with 160 miles per hour, carrying full military load,
and passenger. This is 15 miles per hour faster than any speed ever claimed
an airplane, a truly epoch-making achievement, made possible by the develop
of our new model K motor.

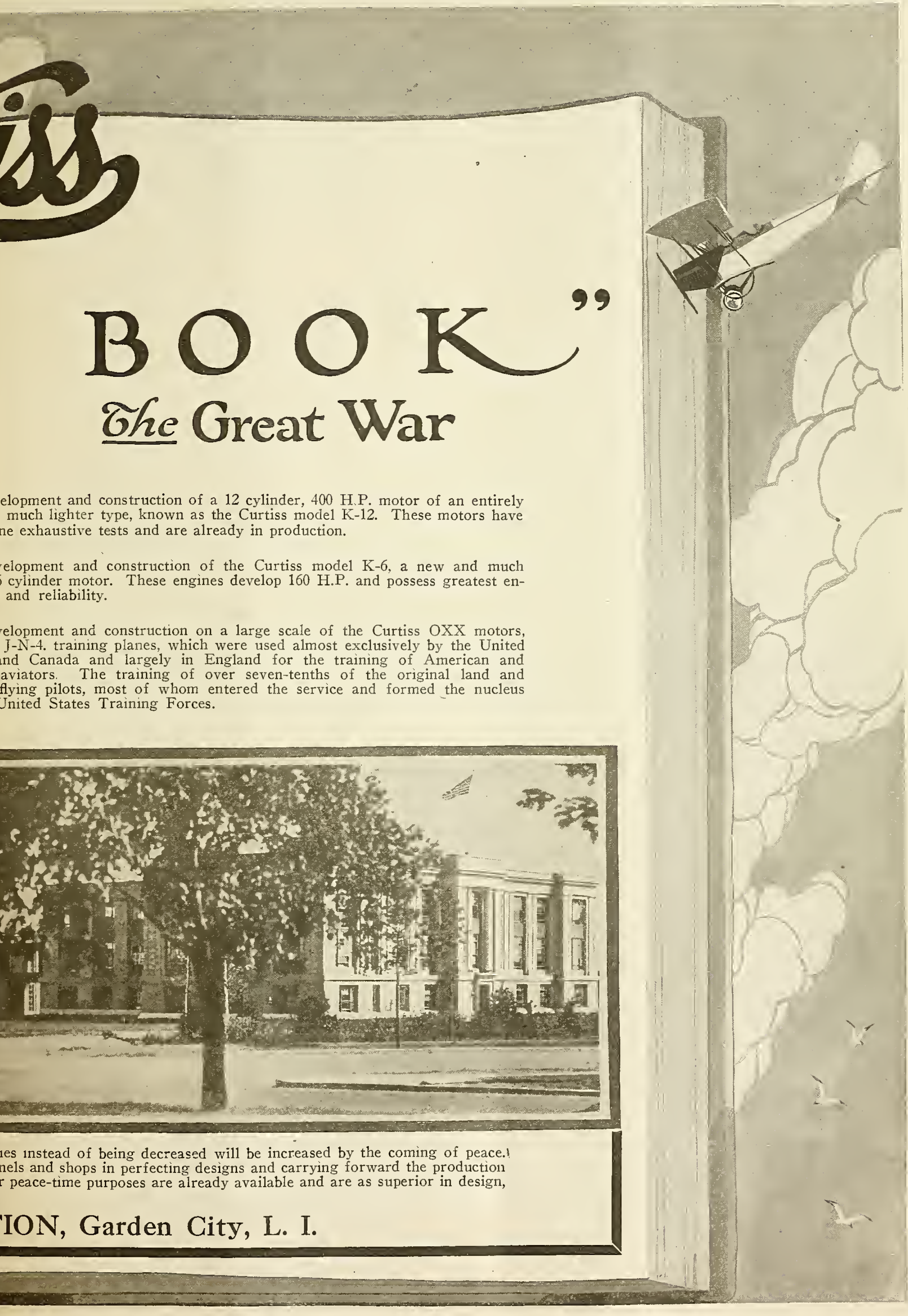
2—The design and construction for the Navy of the largest flying boats in the w
colossal crafts capable of carrying five tons useful load. It was one of these
that recently carried fifty passengers.

3—The design and construction for the U. S. Navy of the fastest and most effi
Seaplane in service anywhere. This craft which is known as the Curtiss model
with Liberty motor, made an official speed of 126 miles per hour with full mi
load, armament, ammunition, pilot and passenger

The Curtiss Engineering Corporation is today the center of aeronau
Glenn H. Curtiss and his engineers have been busy in drafting rooms, re
of suitable commercial types. Aircraft especially designed for sportsman's
workmanship and performance as Curtiss military planes have proved them

CURTISS ENGINEERIN

Member



BOOK"

The Great War

development and construction of a 12 cylinder, 400 H.P. motor of an entirely and much lighter type, known as the Curtiss model K-12. These motors have ergone exhaustive tests and are already in production.

development and construction of the Curtiss model K-6, a new and much ter 6 cylinder motor. These engines develop 160 H.P. and possess greatest en-ance and reliability.

development and construction on a large scale of the Curtiss OXX motors, the J-N-4. training planes, which were used almost exclusively by the United tes and Canada and largely in England for the training of American and tish aviators. The training of over seven-tenths of the original land and ine flying pilots, most of whom entered the service and formed the nucleus the United States Training Forces.

ctivities instead of being decreased will be increased by the coming of peace. tunnels and shops in perfecting designs and carrying forward the production other peace-time purposes are already available and are as superior in design,

ATION, Garden City, L. I.

ssociation.

THE HUGHES AIRCRAFT REPORT

TENTH—SPECIAL MATTERS

(Continued from last week)

1—Purchase of the Plant of the General Vehicle Company

In November, 1917, the Government purchased the plant of the General Vehicle Company at Long Island City, New York, for $1,527,568. The purchase embraced all the real estate, building and machinery constituting the plant, and all other assets, except that patents (other than those relating to internal combustion rotary aircraft engines), franchises, good will, cash, bills and accounts receivable, specified securities and all inventory assets not acquired and used in connection with the manufacture of Gnome engines, were retained by the General Vehicle Company. The Company also agreed to release for the use of the Government its administrative and manufacturing organization so that the Government might take over the plant property and organization as an active manufacturing establishment in full readiness for production. Upon a physical valuation and inspection of the books of the Company by Government appraisers and accountants showing that the price was a fair one on the basis of prices previous to the war, and upon an opinion of the Judge-Advocate General as to the legality of the purchase and as to the propriety of the form of contract, the purchase was recommended by the Aircraft Board.

The advisability of the purchase, however, was doubted at the time by officers of the Government. It appears that at the outset, in formulating the aircraft program, it was supposed that the Gnome rotary engine would be a factor of some importance, and a small order for Monosoupape motors was placed with the General Vehicle Company, but in view of doubts as to the planes to be built, with which such engines would be used, further orders were not placed. Later, on word from overseas that Gnome rotary engines should be put into production, there were negotiations with the General Motors Corporation looking to the acquisition of the General Vehicle plant and the manufacture of these engines in large quantities. Before the matter was closed, the instructions from abroad were changed and the proposed transaction was abandoned. The considerations underlying the purchase are stated in the recitals of the Aircraft Board in the resolution adopted at its meeting of October 19, 1917. It was stated that advices from France indicated a doubt as to the future demand for rotary engines in aviation, but that nevertheless these engines would be used to a greater or less extent for a considerable period to come; that it was desirable that "the technique of manufacture of rotary engines should in any event be studied and developed in the United States in case of need"; that the General Vehicle Company had "the only plant and organization of substantial size in the United States, equipped and organized with the necessary facilities and experience for the manufacture of such engines"; and that the present and future demand for rotary engines was "not sufficient in amount or sufficiently continuous to justify a manufacturer in the maintenance of a plant and organization adequate for a prompt supply of such engines and for the proper study and development of the technique of that type of engine."

In a previous part of this report (*ante*, p. 98), reference has been made to the opinion of the Joint Army and Navy Technical Board, given on November 16, 1917, that in the program for the coming year rotary engines should be considered of secondary importance, but that it was deemed desirable that the art of building rotary engines should be retained in the United States and that for this purpose the organization skilled in rotary engine production should be preserved. While it was thought that an order which had been given to the Union Switch and Signal Company for 2,500 80 H. P. LeRhones was larger than was necessary to preserve the art, it was further recommended that steps be taken to maintain the possibilities of production of the 160 H. P. Gnome engine. The resolution of the Joint Army and Navy Technical Board did not in terms approve the purchase of the General Vehicle Company's plant, nor did it express opposition in any definite way.

The actual necessity of the purchase of the General Vehicle Company's plant is not apparent. As soon as the Government made the purchase, a corporation called the Aeronautical Engine Company, with a nominal capital, was incorporated for the purpose of building Gnome engines at the plant, and contracts were made for the manufacture of small quantities at cost, without profit. This, however, did not continue long. It was found that the Union Switch and Signal Company had mastered the art of making LeRhone engines, and although these were of a different type, it seemed that the necessity of keeping the organization in existence at the plant purchased from the General Vehicle Company soon ceased, or was very much minimized. In April last, it was proposed that the plant at Long Island City be leased to the Wright-Martin Company for the manufacture of the 300 H. P. Hispano-Suiza engines, and an arrangement for this purpose was made soon thereafter, one of the reasons being stated to be "the practical abandonment of the manufacture of Gnome motors."

At the time of the purchase of this plant by the Government, the General Vehicle Company had outstanding notes amounting to $1,530,000, which were held by the Peerless Truck and Motor Corporation. The purchase price paid by the Government was substantially equivalent to the amount of these notes and thus provided for their retirement. The purchase, however, was made on the basis of the value of assets, and whatever difference of opinion there may be as to the advisability of the purchase, there are no facts warranting the conclusion that it was not made in good faith or that the amount paid was in excess of the fair value of the property acquired.

2—Mahogany Manufacturers and Importers Association

True mahogany is a desirable wood (ranking in the opinion of the Government's production engineers next to Black Walnut) for the making of propellers for service or combat aeroplanes. To meet this demand, contracts had been made for Mahogany in the Fall of 1917, but with only one responsible corporation, that is, Lewis Thompson and Company. A contract with one of the companies selected was cancelled because it was apparently without financial resources and could not provide a bond, and in the case of another contractor no deliveries were made.

In the beginning of January, 1918, it appeared that there was a serious shortage in the Government's supply of wood for service-plane propellers, and through the War Trade Board the leading Mahogany manufacturers of the United States were invited to a conference in Washington. This conference was held on January 21st, and at that time, or in the later conferences, the following corporations and firms were represented: Huddleston-Marsh Mahogany Company, Ichabod T. Williams & Sons, George D. Emery Company (said to be closely affiliated with I. T. Williams and Son) and the Astoria Veneer Mills and Dock Company of New York; Palmer, Parker and Company, of Boston; Lewis Thompson and Company, and S. B. Vrooman Company, of Philadelphia; Freiberg Lumber Company, of Cincinnati; C. C. Mengel and Brothers Company, of Louisville; Talge Mahogany Company, of Indianapolis; C. L. Willey Company, of Chicago; and the Otis Manufacturing Company, of New Orleans. At the first conference the manufacturers were notified of the Government requirements for propeller stock, their cooperation was sought, and they were asked to advise the Government of the quantity which each could furnish, and the price. The representatives of the War Trade Board suggested the advisability of an organization of the manufacturers to secure effective cooperation with the Government, and accordingly an association of the manufacturers was at once formed, which appointed a War Committee composed of A. S. Williams, of the Astoria Veneer Mills and Dock Company; C. H. Thompson, of Lewis Thompson and Company; F. C. Leary, of Ichabod T. Williams and Sons, F. G. Otis, of the Otis Manufacturing Company; and J. C. Wickliffe, of the C. C. Mengel and Brother Company. The Committee met at once and passed a resolution expressing the opinion that the best interests of the Government would be served by the purchase by the Government "of all Central American mahogany logs now under contract with the members of the Association at a price to be agreed upon; the Government to arrange transportation of said logs; the manufacturing of the logs into lumber to be done by the mills represented by this Association at a price to be agreed upon." At the same meeting, the officers of the Association were elected: Thomas Williams, of Ichabod T. Williams & Sons, President; R. S. Huddleston, of the Huddleston-Marsh Mahogany Company, Treasurer; and Charles H. Thompson, of Lewis Thompson and Company, Secretary. This proposition was rejected by the representatives of the Signal Corps, for reasons stated at length, which were in substance that it was deemed inadvisable that the Government should arrange for the purchase of logs directly from the loggers in Central America and Mexico in view of the unfamiliarity of the Signal Corps with the logging business, or that the Government should take over existing contracts for purchases of logs on account of the complications that might arise, or that the Government should become directly involved in log purchases. Recognizing the difficulties in the disposal of a largely increased quantity of lumber, the representatives of the Signal Corps felt disposed to pay "a higher price than pre-war or existing prices for propeller stock," in order that the mahogany manufacturers might offset any loss due to the low market value of rejected material. It was then recommended by the Signal Corps that the manufacturers should make a proposition as to the price to be paid for propeller stock, and it was stated for the manufacturers that they could not quote prices on the basis of the existing Signal Corps specifications, as these were too restrictive as to the grade to be selected and permitted the Signal Corps to accept or reject the material based upon the judgment of the inspector. It was finally suggested that the manufacturers should submit a proposition based on what are called 'National Hardwood Inspection' rules (that is, the rules of the National Hardwood Lumber Association) quoting a separate price on "first and seconds, selects and No. 1 common". Discussions continued between the War Committee of the Association and representatives of the Government, among the latter being Lieutenant Ryerson, who was in charge of propeller parts in the Plane Production Section; Joseph S. Otis (who, as the result of a disagreement, had recently severed his connection with the Otis Manufacturing Company and had offered his services to the Government as a mahogany expert) and representatives of the Lumber Committee of the Council of National Defense. At the meeting on January 23rd, according to Lieutenant Ryerson's report, the War Committee of the Association suggested prices for propeller mahogany according to 'National Hardwood Inspection' rules as follows: firsts and seconds, $350 per M feet; selects, $320; No. 1 common, $270. After these figures were submitted a discussion of costs followed, in which Joseph S. Otis, representing the Government, and J. C. Wickliffe, representing C. C. Mengel and Brother Company, gave their respective estimates of costs. Mr. Otis' estimate was considerably lower than the other and was contested by Mr. Wickliffe. The question of specifications was again discussed, and the Signal Corp representatives stated that it would be impossible to place orders on the basis of 'National Hardwood Inspection' rules, which permitted widths considerably less than those required for propeller stock. After further parley, Lieutenant Ryerson stated that it would be preferable to negotiate with the various manufacturers and importers individually for the purchase of such mahogany as they were in a position to offer. It was considered that if negotiations could not be brought to a close on the basis of the prices quoted that it might be desirable for the Government to fix a price for the purchase of propeller stock and agree to provide in its contracts that after partial performance there should be an audit of costs and a readjustment of prices upon a fair basis.

After the negotiations had thus proceeded for several days, the manufacturers submitted to the officials of the Signal Corps the opinion that Joseph S. Otis was not competent to advise the Signal Corps with respect to mahogany costs and suggested that action should be taken by which some one should be put in charge of the purchases of mahogany for the Government "who could develop the actual facts and be fair to the industry." Joseph S. Otis left the Signal Corps on January 29th. On January 31st Henry Lockhart, Jr., was placed in charge of the 'Materials Department, Foreign and United States,' which had the duty of procuring the materials necessary for the production of aeroplanes, with the exception of motors and instruments. About February 5th, Henry K. S. Williams, who had formerly been in the lumber business as a member of the firm of Ichabod T. Williams & Sons,) being a brother of Thomas Williams of that firm) but had retired several years before, was put at the head of the Hardwoods Section, which was a sub-division of the Materials Department and had charge of the orders for woods required for propeller stock. Shortly after, on February 25th, J. C. Wickliffe, who had been for ten years Secretary of the C. C. Mengel and Brother Company of Louisville, and had been active as a member of the War Committee of the Mahogany Manufacturers and Importers Association, entered the service of the Government as assistant to H. K. S. Williams in the Hardwoods Section. The suggestion that he should take this position was made about the middle of February in a conversation between H. K. S. Williams and Mr. Mengel when the latter was asked if he could spare Mr. Wickliffe from his organization. On March 4, 1918, J. Edward McCullough, who had been superintendent at the mill of the George D. Emery Company, one of the members of the Mahogany Manufacturers and Importers Association, was made district inspector of mahogany as well as other woods in the New York district, embracing Boston, New York, Philadelphia and New Orleans. He was selected by S. B. Vrooman, Jr., who about February 10th was given general charge of the inspection of all propeller lumber throughout the country. Prior to his connection with the Government (he started as an inspector in December, 1917) S. B. Vrooman, Jr., had been in the service of the S. B. Vrooman Company, also one of the members of the Mahogany Manufacturers and Importers Association; he was, and has continued to be, during his service with the Government, one of the stockholders of that corporation (*ante*, p. 68).

Mr. Wickliffe, during his connection with the C. C. Mengel and Brother Company, had owned five shares of its preferred stock, which he disposed of some years ago; his wife owned five shares of the common stock, which were sold when he entered the Government service.

His salary as secretary of the Mengel Company had been $500 a month; his compensation from the Government was at the rate of $4,000 a year. When it was suggested that he should become connected with the Government, he said that he could not afford it, but he was informed that Mr. Mengel had offered to continue his salary "as a donation to the Government during the war." Mr. Wickliffe replied that he did not like the arrangement, would not accept it without Mr. Lockhart's approval, and in any event would not consent to be paid for than enough to defray the living expenses of himself and his family. Mr. Wickliffe was paid by the Mengel Company, in addition to his salary from the Government, $250 on March 25th, $250 on March 29th, and $250 on April 15th, a total of $750. This was subsequently adjusted on the basis of $350 for the period to April 1st and $400 was returned by Mr. Wickliffe to the Mengel Company. This was explained in Mr. Wickliffe's letter to Mr. Mengel as follows:

"628 Lexington Place, Washington,
Apl. 13th, 1918.

"Mr. C. R. Mengel,
Prest., C. C. Mengel & Bro. Co.
Louisville, Ky.

"Dear Mr. Mengel:

"The Signal Corps having fixed the salary I am to receive from them at the highest figure they can pay of $4,000.00 per annum, I want to let you know that I think it necessary now that you reduce the amount that you are remitting me monthly to $350.00 per month. As near as I can estimate it, I can get by on Washington living expenses and do such official entertaining as I shall have to do on the sum of these two amounts. If I find that I cannot, I shall frankly let you know the condition. But I feel that living here and doing the necessary at my present job on this figure is about the equivalent of the salary I had when I was with you in Louisville. Therefore, kindly give the necessary instructions to have the remittance cut down.

"Again thanking you and the Company through you, I am,

"Very truly yours,
"J. C. WICKLIFFE."

The arrangement with C. C. Mengel and Brother Company was approved by H. K. S. Williams in his letter of April 24, 1918, as follows:

"Washington, D.C.,
April 24, 1918.

"From: Office of the Chief Signal Officer.
"To: C. C. Mengel & Brother Company,
Louisville, Ky.
"Subject: Services.

"1. In line with the request of your president, Mr. C. R. Mengel, this Section desires to give you this letter stating that at the time it asked you for the services of your former secretary, Mr. J. C. Wickliffe, it was fully understood by it that you or the Mahogany Industry would pay him an amount of money per month over and above the salary the Signal Corps was authorized to pay him, so that the sum of these two would be sufficient to cover his and his family's expenses during their service with the Signal Corps. This was done with the full knowledge of Mr. Henry Lockhart, Jr., Head of the Materials Department, because of the fact that the Hardwood Section needed his services, and in view of the further fact that your offer to do this was made with the distinct understanding that he should sever all connection with your company and with the mahogany industry and assume his new duties, of course, entirely as a member of the Signal Corps organization. This Section would also set forth the fact that your offer was specifically asked by you to be considered in the light of a donation to the war.

"By direction of the Acting Chief Signal Officer.
"HENRY LOCKHART, JR.
"Materials Department, Foreign and United States,
"By H. K. S. WILLIAMS,
"Hardwood Section."

The salary which S. B. Vrooman, Jr., had received from the S. B. Vrooman Company had been continued by that company, and, when J. Edward McCullough entered the service of the Government, the George D. Emery Company paid, until the arrangement mentioned below, the difference between his Government pay and his former compensation from the company.

It was soon arranged that the Mahogany Manufacturers and Importers' Association should assume the payment of the additional compensation to Mr. Wickliffe and to Mr. McCullough. Accordingly, for the period beginning with April this compensation was paid to both in checks from Mr. Huddleston, the Treasurer of the Association. The amounts were raised by voluntary contributions of various members of the Association. The minutes of the Association show the following action in the matter:

"The matter of the difference in compensation between the amount paid by the Government for services to J. C. Wickliffe and to Mr. McCullough and the amount of compensation previously received was discussed. The following resolution was then presented, duly seconded and adopted by the affirmative vote of all present:

"Resolved that such excess compensation be paid by the various members of the Association in the form of an annual subscription, which is made up by various amounts subscribed by the mahogany firms, amounting in total to Fifty-Seven Hundred ($5,700) Dollars.

"The motion was duly made, seconded and carried by the affirmative vote of all present, that a copy of this resolution be sent to Mr. H. K. S. Williams."

Mr. Wickliffe testifies that this arrangement was made "because it was felt that it was not right for any one individual firm to pay it all." Mr. Huddleston testifies that it was "purely a question of cooperation with Mr. Mengel." Early in May there was correspondence between H. K. S. Williams and Mr. Huddleston, the Treasurer of the Mahogany Association, in which a letter in the following form, addressed by Mr. Huddleston to Mr. Wickliffe, was first submitted to H. K. S. Williams and approved by him:

"347 Madison Avenue
"New York, N. Y.,
"May 10, 1918.

"Mr. J. C. Wickliffe,
Materials Department, Foreign & United States,
Hardwood Section, Washington, D. C.

"My dear Mr. Wickliffe:

"A few days ago, when the heads of the various mahogany importing and manufacturing concerns met for general discussion, attention was called to the fact that by virtue of your recent appointment as Assistant to Mr. H. K. S. Williams, your annual income has been cut something in excess of fifty per cent.

"After a general discussion, it was agreed that it would not be fair that you stand alone the burden imposed on you by your services to the Government in this particular Department, therefore, it was mutually agreed that the various mahogany firms, feeling as patriotic as you have demonstrated yourself to be, will make up the difference between your former income and what you are now receiving from the Government, provided such an act would meet with the approval of Mr. H. K. S. Williams, the head of your department.

"I am pleased to advise you that I am today in receipt of a letter from Mr. H. K. S. Williams, approving of this transaction; so acting in the capacity of Treasurer, I will mail you each month a check for $350.00 beginning the month of April, which I am informed will make up the difference in your salary."

A similar letter was written, with the approval of H. K. S. Williams, to Mr. McCullough. Mr. McCullough was paid by the Association for April, May, June and July at the rate of $91.67 a month. He returned to his former employment early in August. In the case of Mr. Wickliffe, the arrangement continued until it was officially disapproved on August 20, 1918, by Mr. J. Gilmore Fletcher, on behalf of the Bureau of Aircraft Production, in the following letter:

WAR DEPARTMENT
BUREAU OF AIRCRAFT PRODUCTION
Washington

August 20, 1918.

"Mr. J. C. Wickliffe,
"Hardwood Section,
"119 D Street, N. E.
"Washington, D. C.

"My Dear Mr. Wickliffe:

"In view of the fact that the Government looks with disfavor upon your receiving from the Mahogany Manufacturers & Importers Association your present monthly remittance, which I shall refer to here as a salary of $350.00 per month, I deem it best, and hereby request, that you immediately refuse to accept any further payments from that source, or any other source which comes in direct line with your duties in the Hardwood Section, the Raw Materials Department, Division of Aircraft Procurement, Bureau of Aircraft Production.

"I shall at once take the proper steps to have the salary now paid you by the Government, namely, $4,000.00 per year, increased to $8,200.00 per year, and shall make every effort to expedite a decision on the point of allowing you this increase.

"Yours very truly,
"J. GILMORE FLETCHER,
"Chief of Aircraft Procurement."

Mr. Wickliffe immediately requested Mr. Huddleston to discontinue the payments, and accordingly there has been no payment of additional compensation since the payment for the month of July.

Early in February, 1918, arrangements were made with some of the manufacturers for the taking over of certain mahogany which has been under contract for delivery to British merchants, but the amount was relatively small. After H. K. S. Williams took charge of the Hardwood Section, and also after J. C. Wickliffe became his assistant, negotiations were continued with the manufacturers composing the Mahogany Manufacturers and Importers Association for the purchase by the Government of mahogany in large quantity for propeller stock. On the appointment of H. K. S. Williams, his brother, Thomas Williams (of Ichahod T. Williams and Sons) had resigned as President of the Association, and C. R. Mengel was elected in his stead. On February 14, 1918, new specifications had been adopted by the Signal Corps (No. 15,028-A) modifying and liberalizing the prior specifications which had been adopted in the previous December. At about the same time (February 13th) the manufacturers had submitted two proposals, one under the Signal Corps specifications (No. 15,028-A) at $400 per M feet for firsts, seconds, and selects, and $320 per M. feet for lower grades, f. o. b. cars eastern mills (with corresponding prices for other points according to estimated freight rates), and another proposal under the 'National Hardwood' rules for specified sizes at $350 per M feet for firsts, seconds, and selects, and $280 per M feet for No. 1 common, f. o. b. cars eastern mills. These had been refused. The important difference was with respect to the inspection.

In this situation, a conference was held on March 6th between the manufacturers and H. K. S. Williams, J. C. Wickliffe, and S. B. Vrooman, Jr., representing the Government. The minutes of this conference show that H. K. S. Williams opened the meeting with the announcement that "it was the purpose of the Signal Corps to grant as liberal an inspection as could be given consistent, of course, with the principle that no lumber could be taken that would not make propeller blades." After a discussion of the matter of utilizing lumber which showed scattered pin-worm holes, and the opinion having been expressed by Mr. Vrooman that such stock could be used where it did affect the strength of the board, Mr. Williams stated that he would endeavor to have the Inspection Department accept such lumber. This as Mr. Wickliffe testifies, was accomplished. The minutes show that Mr. Williams "stated that Mr. Vrooman is going to be in charge of the inspection all over the country; that he will appoint various men to do the inspecting at the various mills, and shall show them what is to be done. Mr. Williams further stated that his object in having Mr. Vrooman at this conference was that "the interpretation of the Signal Corps specifications might be as easy as such interpretation could be made consistent with the principle of accepting only propeller material but that the Government might get all such material that it could get." Mr. Williams then requested that each manufacturer advise him of the cost of its logs placed alongside steamer at Central American and Mexican loading points, and these estimates were given.

Another conference was held on the same day between the manufacturers and H. K. S. Williams and J. C. Wickliffe, representing the Government, at which, after considerable discussion, Mr. Williams stated that he would recommend the payment by the Government of the following scale of prices on Mexican and Central American mahogany propeller stock under Signal Corps specifications No. 15,028-A, as follows: $350 per M feet for first, seconds and selects, and $280 for lower grades, f.o.b. eastern and middle western points, and $330 and $265, respectively, at New Orleans; and the same schedule of prices was stated for African mahogany f.o.b. eastern and middle western points. At these conferences Mr. Wickliffe was in attendance as Mr. Williams' adviser. He reviewed the manufacturers' estimates and made calculations for Mr. Williams as to costs, and in view of his extensive experience there can be no doubt that considerable reliance was placed upon his opinion and advice. The terms of the contracts were virtually settled, in accordance with Mr. Williams' proposal, at the second conference on March 6th, and these terms were subsequently approved by Mr. Lockhart. The formal contracts were not made until sometime later. On March 26th the Aircraft Board recommended the execution of the contracts, on the above terms for the following quantities:

For African mahogany:

	Minimum	Maximum
Astoria Veneer Mills Dock Co.	2,000,000	3,500,000
I. T. Williams & Sons	500,000	1,500,000
Palmer & Parker Company	600,000	1,500,000
C. C. Mengel & Bro. Company	2,800,000*	2,800,000
Talge Mahogany Company	2,130,000	2,450,000

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*Amended to read 1,700,000 minimum.

(*Continued on page* 872)

NAVAL and MILITARY AERONAUTICS

Key to Abbreviations

AAD—Assigned to active duty.
ABC—Report to Army Balloon School, Arcadia, Cal.
ABC—Report to Army Balloon School, Arcadia, Cal.
ADO—Report to Aviation Supply Depot, Dayton, Ohio.
ADT—Report to Aviation Supply Depot, Dallas, Texas.
AFO—Report to Aviation Supply Depot, Fairfield, O.
AGC—Report to Aviation Supply Depot, Garden City, L. I., N. Y.
AHT—Report to Aerial Gunnery School, Houston, Texas.
AIR—Transferred to the Air Service, National Army, without change in rank or date of commission.
ALF—Report to Camp Alfred Vail, Little Silver, N. J.
AMV—Report to Aviation General Supply Depot, Morrison, Va.
AOV—Report to School for Aerial Observers, Hampton, Va.
APR—Report to School of Aerial Photography, Rochester, N. Y.
ARV—Report to Aviation Supply Depot, Richmond, Va.
ASM—Report to Aviation Mechanics' Training School, St. Paul, Minn.
BFT—Report to Barron Field, Fort Worth, Texas.
BRN—Report to Bakers Field, Rochester, N. Y.
BST—Report to Brooks Field, San Antonio, Tex.
CAF—Report to Carlstrom Field, Arcadia, Fla.
CAP—Commissioned as Captain, Aviation Section, Signal Corps.
CDT—Report to Aviation Concentration Camp, Dallas, Texas.
CFT—Report to Carruthers Field, Fort Worth, Texas.
CGC—Report to Aviation Concentration Camp, Garden City, L. I., N. Y.
CGS—Report to Aviation Concentration Camp, Greenville, S. C.
CIT—Report to Radio School, Carnegie Institute of Technology, Pittsburgh, Pa.
CJS—Report to Camp Jackson, Columbia, S. C.
CJW—Report to Camp John Wise, San Antonio, Texas.
CLR—Commissioned as Colonel, Aviation Section, Signal Reserve Corps.
CMV—Report to Aviation Concentration Camp, Morrison, Va.
CPA—Commissioned as Captain Air Service, National Army.
CPR—Commissioned as Captain, Aviation Section, Signal Reserve Corps.
CRI—Report to Chanute Field, Rantoul, Ill.
CSO—Report to the Chief Signal Officer, Washington, D. C.
CUI—Report to School of Military Aeronautics, Cornell University, Ithaca, N. Y.
CWT—Report to Call Field, Wichita Falls, Texas
DAF—Report to Dorr Field, Arcadia, Fla.
DAP—Report to Director of Aircraft Production, Washington, D. C.
DIK—Report to Camp Dick, Dallas, Tex.
DIS—Honorably discharged from service.
DMA—Report to Director of MilitaryAeronautics, Washington, D. C.
ELA—Report to Eberts Field, Loanoke, Ark.
EOT—Report to Ellington Field, Olcott, Texas.
FLA—Commissioned as First Lieutenant Air Service, National Army.
FLR—Commissioned as First Lieutenant, Aviation Section, Signal Reserve Corps.
FLT—Commissioned as First Lieutenant, Aviation Section, Signal Corps.
FOB—Report to Fort Omaha Balloon School, Omaha, Neb.
FRF—On duty requiring regular and frequent aerial flights.
FSO—Report to Fort Sill School for Aerial Observers, Fort Sill, Okla.
GIT—Report to School of Military Aeronautics, Georgia Institute of Technology, Augusta, Ga.
GLC—Report to Gerstner Field, Lake Charles, La.
HHN—Report to Hazelhurst Field, Mineola, L. I., N. Y.
JMA—Rated as Junior Military Aviator.
JRC—Report to Jackson Field, Riverside, Cal.
KST—Report to Kelly Field, So. San Antonio, Tex. (When specified in the order, the number of the field is given in parentheses)
LDT—Report to Love Field, Dallas, Tex.
LHV—Report to Langley Field, Hampton, Va.
MAC—Report to March Field, Allesandro, Cal.
MAJ—Commissioned as Major, Aviation Section, Signal Corps.
MAT—Report to Mather Field, Sacramento, Cal.
MDO—Report to McCook Field, Dayton, Ohio.
MIA—Report to U. S. Naval Air Station, Miami, Fla.
MIT—Report to School of Military Aeronautics, Massachusetts Institute of Technology, Boston, Mass.
MJA—Commissioned as Major Air Service, National Army.
MJR—Commissioned as Major, Aviation Section, Signal Reserve Corps.
MSC—Report to Radio School, Maryland State Agricultural College, College Park, Md.
OBS—Attached to the Aeronautical Service as Observers.
OSU—Report to School of Military Aeronautics, Ohio State University, Columbus, Ohio.
PFO—Report to Post Field, Fort Sill, Okla.
PMT—Report to Park Field, Millington, Tenn.
PUP—Report to School of Military Aeronautics, Princeton University, Princeton. N. J.
PWM—Report to Payne Field, West Point. Miss.
REL—Relieved from present duty.
RSD—Report to Rockwell Field. San Diego. Cal.
RTR—Retransferred to organization attached to previous assignment to aviation duty.
RWT—Report to Rich Field, Waco, Tex.
SBI—Report to Scott Field, Belleville, Ill.
SAG—Report to Souther Field, Americus, Ga.
SGS—Report to Camp Sevier, Greenville, S. C.
SLA—Commissioned as Second Lieutenant Air Service, National Army.
SLR—Commissioned as Second Lieutenant, Aviation Section, Signal Reserve Corps.
SLT—Commissioned as Second Lieutenant, Aviation Section, Signal Corps.
SMA—Report to School of Military Aeronautics, Cambridge, Mass.
SMM—Report to Selfridge Field, Mount Clemens, Mich.
SRC—Report to Columbia School for Radio Officers, New York City.
TFT—Report to Taliaferro Field, Fort Worth, Texas. (When specified in the order, the number of the field is given in parentheses)
TMA—Report to Taylor Field, Montgomery, Ala.
UCB—Report to School of Military Aeronautics, University of California, Berkeley, Cal.
UIU—Report to School of Military Aeronautics, University of Illinois, Urbana, Ill.
UTA—Report to School of Military Aeronautics, University of Texas, Austin, Tex.
VBW—Report to Vancouver Barracks, Washington.
WAC—Report to Aviation Concentration Camp, Waco, Tex.
WCS—Wire to the Chief Signal Officer upon arrival.
WDM—Wire, Director of Military Aeronautics, upon arrival.
WFO—Report to Wilbur Wright Field, Fairfield, Ohio.

Notes

Note 1--Report to places mention in the order named.

Note 2—Report to Middletown, Pa., to Commanding Officer.

Note 3—Report to Virginia Polytechnic Institute, Blacksburg, Va.

Note 4—Report to District Manager, Dayton, Ohio, and wire DAP

Note 5—Report to Little Rock, Ark., to Aviation General Supply Depot.

Note 6—Report to University of Pennsylvania, Philadelphia, Pa.

Note 7—Report to Fergus Motors of America, 370 Jelliffe Ave., Newark, N. J., and wire DMA.

Note 8—Report to H. H. Franklin Co., Syracuse, N. Y.

Special Orders Nos. 289 to 293, Inclusive

A

Arthur, Eber O.	FLA
Anderson, Paul Raymond	SLA: LHV
Armstrong, James Francis	SLA: LHV
Andrews, Roger W.	FLA
Ashe, William O'Brien	SLA; LHV
Apte, Benjamin Ethan	SLA; LHV
Allenberg, Sidney Leon	SLA: LHV
Angell, Harry M.	CPA
Amis, William N.	EOT
Allison, Roy G.	CAF
Allen, Albert A.	CWT
Allen, Richard C.	CAF
Alcorn, Kent A.	CAF
Atwell, William B.	CAF
Arnold, Warren C.	DMA

B

Birdsall, Carl A.	FLA
Barnett, Keff Dobs	SLA: LHV
Belmont, Morgan	FLA
Beverly, Belmont F.	CPA
Brown, Jasper C.	FLA
Blair, Lyman S.	CPA
Baker, Charles D.	FLA
Baucom, Byrne E.	FLA
Blades, Fred Harris	SLA; LHV
Butcher, Adrian M.	CPA
Bissell, Eugene Van Name	SLA; LHV
Bartlett, Dwight M.	CPA
Blake, Thomas J.	FLA
Babcock, Philip B.	CPA
Buford, Edward	CPA
Barrett, Carl Henry	SLA; LHV
Bennett, Frank Crim	SLA; LHV
Blake, Everett Buell	SLA; SMM
Borre, Peter Celestine	DMA
Berkley, Scott B.	PFO
Beers, George M.	DMA
Bentley, Madison	DMA
Beverley, Efford A.	LHV
Brockman, Ervin	CFT
Boothe, Ross	KST
Brown, Ronald Wheten	EOT
Bagley, Harvey B.	FLA
Bagby, Howard	EOT
Bonham, John A.	PWM
Bacon, Leonard	PFO
Butler, Joseph F.	KST
Bartlett, Lowell W.	CAF
Bunting, Walter M.	EOT
Brown, Lucien Seymour	SLA; SMM
Burkhardt, Harry L.	CAF
Brandon, Joseph F.	LDT
Brooks, Thomas	EOT
Brown, Kenneth P.	CAF
Boyd, William L.	CAF
Brandt, Howard C.	EOT
Brown, Raymond R.	CAF
Blair, James	CAF
Bower, Claire A.	EOT
Burns, John V.	CAF
Bushman, Francis L.	CAF
Billiter, Earl D.	CAF
Blystone, Raymond J.	CAF

C

Cook, Seth W.	TMA; DMA; Note 1

Cabot, Thomas D.	CAF
Clark, Wilson Truesdale	SLA; EOT
Crawford, Otis Black	MAC
Christensen, Rudolph	SLA; EOT
Comer, E. Hunt	SLA; EOT
Corey, Horace Marvin Hoyt	ELA
Cole, Chester A.	CPA
Clarkson, Fuller	SLA; MAC
Camp, Bernard Franklin	SLA; CFT
Castner, Charles Beaumont	SLA; LHV
Calder, Paul Joseph	SLA; LHV
Colgan, John C.	CPA
Carlisle, Russell B.	FLA
Conley, Arthur John	SLA; LHV
Cushman, Harland Burbank	FLA
Canfield, Dwight Joseph	SLA; LHV
Coleman, Edward Beauclerk	SLA; LHV
Crehore, William W., Jr.	CPA
Cummings, George B.	FLA
Crowley, Arthur James	SLA; LHV
Cobb, Vaughn Merwin	SLA; RWT
Cameron, Mortimer B.	KST
Cleveland, Bruce	SLA; KST
Carlisle, Louis George	SLA; SBI
Cash, Thomas Henry	SLA; EOT
Cohen, Marcus Harris	SLA; KST
Coulter, Isaac H.	CJW
Cole, Perry C.	CAF
Campbell, Theodorick P.	Note 3
Carroll, Mitchell B.	Note 7
Chandler, Lane T.	CAF
Conner, Edward S.	EOT
Campbell, Archibald Francis	SLA; SMM
Calvin, Warren Ellwood	SLA; SMM
Clark, Thomas Alexander	SLA; SMM
Clark, Ben H.	EOT
Christie, James A.	ABC
Caldwell, Alanson T.	EOT
Crouse, James A.	EOT
Curtis, John Jacob	SLA; SMM
Cooper, George W.	CAF
Cross, John M.	EOT
Coney, William D.	CAF
Collier, Robert Kenneth	SLA; SMM
Cummings, Charles M.	CAF
Coates, Aaron T.	CAF
Crawford, Daniel McL.	CAF
Craig, Robert M.	CAF
Calvin, Warren Ellwood	SLA; SMM

D

Decker, Silas M.	Note 2
Davis, Fred John	DAP
Drennan, Leonard H.	DMA
Denton, Edward A.	SLA
Davis, George Lewis	SLA; PWM
Duer, Beverly	CPA
Davis, Homer H.	CAF
Dorland, Crester P.	RSD
Druschel, J. D. Henry	SLA; LHV
Duncan, Ralph Ray	SLA; SMM
Delaney, John J.	EOT
Davidson, Rufus B.	EOT
Denton, George R. S.	LDT
Davis, Trayton Hooker	CRI
Davis, William H.	KST
Dobie, Richard L.	CAF
Drinker, Philip	FLA
Day, Harold M.	SAG
Dickinson, Roy W.	EOT
DeMarest, Robert K.	DMA
Dawson, Athel A.	DMA
Dry, Paul Homer	CFT
Downer, Godfrey K.	CPA
Du Puy, Harry Heath	MAC
Daley, James Henry	SLA; CFT
Day, Henley F.	DMA
Doane, Samuel Frederick	SAG
Dunford, Samuel W.	CAF
Dean, William J.	DMA
Driscoll, Egbert G.	TMA
Downes, Philip H.	CAF
Duke, Thomas Walter Daniel	SLA; LHV
Dulaney, Ken Rogers	EOT
Delaplane, Edwin S.	CAF
Darley, Edward Dean	SLA: KST
Dwindell, Ralph M.	EOT
Drumm, John R.	EOT
Davis, Cyril Randall	SLA; SMM
Duncan, Ralph Ray	SLA; SMM
Diamond, Aubrey F.	FLA
Donaldson, William Thomas	SLA; LHV
Dorsett, Walker C.	CAF

E

Emerson, Wilbur T.	DMA
Ehlers, George W.	CAF
Emmons, Howard Edward	CFT
Eylers, John D.	DMA
Evans, Jesse M.	EOT
Early, John M.	EOT
Easterly, Leon Eugene	SLA; LHV
Edwards, Ellis E.	CAF
Edwards, Joseph S.	CPA

F

Fuller, Willard P.	DMA
Fordyce, Addison A.	DMA
Flack, Augustus S.	MAT
Fisk, James K.	MAT
Field, William P.	DMA
Friend, William Howard	SLA; LHV
Flynn, Edward J.	DMA
Fancher, John T.	FLA
Fagley, Wilber Mantz	CRI
Fithian, Donald C.	DMA
Farmer, Glenn	SLA; LHV
Franzen, Frank Clarence	FLA
Fleeson, Howard T.	FLA
Field, David Edwards	SLA; LHV
Folker, Arnold Frank	SLA; RWT
Ferris, Frank Cagle	SLA; LHV
Feick, James William	SLA; LHV
Franklin, Ruford Davis	CPA
Fisher, Ralph Bentley	SLA; LHV
Fitzpatrick, Francis E.	EOT
Feeney, Francis J.	CAF
Foley, Frank Joseph	SLA; SMM
Fletcher, Frederick A.	FLA
Foster, Raymond W.	EOT
Francis Paul R.	EOT
Field, Rex E.	LDT
Foley, Frank Joseph	SLA; SMM
Fairbairn, George R.	EOT
Foster, Thad V.	RSD
Flynn, Edward J.	CAF
Ford, Fred M.	LDT

G

Garnett, Joseph H.	CAF
Graves, Thomas E.	DMA
Griffith, Frederick W.	ALF
Gillern, Maurice F.	ABC
Gass, Karl William	SLA; LHV
Godlove, Walter	SLA; RWT
Getty, Lorenzo T.	CPA
Griffin, Clarence J.	FLA
Greenwood, John H.	DMA
Graham, Ardi McConnell	SLA; LHV
Grant, Frederick F.	CPA
Greve, Sydney Martin	SLA; KST
Greer, Jack	EOT
Garrett, Kenneth	EOT
Goldsmith, Henry S.	EOT
Gaston, Alexander N.	RSD
Gray, Ralph M.	CAF
Gaylor, Elmer J., Jr.	RSD
Grayson, Forrest	EOT
Gruny, George R.	EOT
Gardner, J. Francis	RSD

H

Hall, Frank L.	ELA
Howell, Francis K.	KST
Hutchins, Benjamin B.	LDT
Hill, Edward A.	Note 2
Harris, Sidney Louis	SLA; RWT
Hunter, Charles Glenn	SLA; RWT
Howard, Charles Wilmot	SLA; LHV
Heinsohn, Robert A.	SLA; LHV
Hyman, Edgar Charles	SLA: LHV
Hersey, George F.	ABC
Howard, Harley	SLA; ELA
Hill, Luther White	SLA; RWT
Hawkinson, John L.	SLA
Houston, Charles Horace	SLA; RWT
Hunt, Arthur W.	FLA
Hallonquist, Laurent Cholet	SLA: RWT
Hobson, Henry S.	CPA
Hills, Jesse Almond	SLA: LHV
Hickman, Willis G.	FLA
Harding, George R.	FLA
Haddaway, Roland	SLA: CRI
Holland, Oark	SLA: SMM
Humason, Allen B.	PWM
Henry, Rufus Francis	KST
Hechinger, Michael Vincent	CRI
Huebner, Herbert C.	FRF
Hawes, Curtis	Note 4
Huston, Sylvester	EOT
Hamlin, Charles E.	RSD
Haasl, Charles M.	EOT
Haylor, John R.	RSD
Hayes, Fred E.	SAG
Hill, John C.	RSD
Haines, Frank B.	RSD
Holland, Park	SLA; SMM
Henry, William H.	RSD

I

Isbell, Henry W.	DMA
Innis, Cecil R.	EOT

J

Johnson, Emil R.	KST
Johnson, Arthur Lowell	KST
Jamison, Joy G.	KST
Jones, James E.	CWT
Jones, Lee B.	ABC
Johnson, Edwin	CAF
Jones, David Clarence	SLA; SMM
Johnson, Austin Samuël	SLA; CRI
Jolliffe, Carey Coale	SLA; LHV
Jewell, Daniel Ashley	SLA; RWT
Jackson, Gerard Livingston	SLA; LHV
Jackson, Roy O.	DMA
Jones, Charles S.	HHN
Johnson, Charles Chouteau	RSD
Jenkins, Nelson D.	EOT
Jackson, Roger W.	RSD
Jones, David Clarence	SLA; SMM

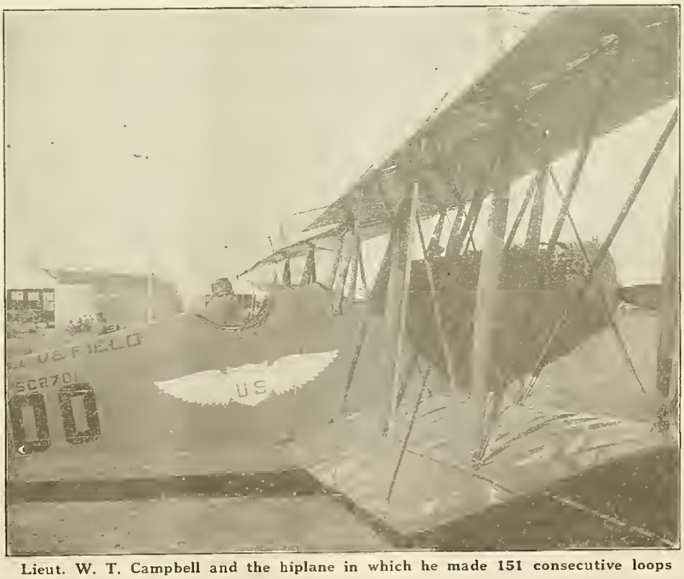
K

Kennedy, Frank Hopkins	SLA; CRI
Kayser, William Edward	SLA; SMM
Kuhlman, Lawrence	SLA; SMM
Keating, Archie Francis	SLA; RWT
Keeffe, Louis R.	DMA
Knight, Theodore C.	CPA
Kilpatrick, James I.	SLA; LHV
Kennedy, Charles Bayara	SLA; LHV
Kelly, William H.	CWT
Kerfoot, Raymond Whitney	SLA; LHV
Kelsey, James B.	RWT
Kerr, Charles Phillips	CPA
Keith, Warren Irving	SLA; SMM
Kennedy, Robert J.	Note 8
Keith, Warren Irving	SLA; SMM
Kaufmann, Godfrey F.	RSD
Kunkel, Henry W.	EOT
King, William G.	CAF
Kent, Arthur O.	RSD
Keough, Wesley L.	RSD
King, Edward R.	EOT

L

Lawson, Walter R.	PFO
Luecke, Christian H. W.	DMA
Lerner, Nathaniel M.	CPA
Little, James Clinton	SLA; SMM
Lingle, David G.	KST
Lane, Lee Britton	SLA; KST
Lassiter, Robert E.	DAP
Loring, Charles G.	CPA
LaForge, Robert B.	FLA
Lofland, Knox	SLA; LHV
Looram, Lucien A.	CWT
Larkin, Garrett Francis	PWT
Landis, Reed G.	CPA

(Continued on page 875)



Lieut. W. T. Campbell and the biplane in which he made 151 consecutive loops

FOREIGN NEWS

Marconi Company to Supply Wireless Passenger and Mail Aeroplanes

LONDON.—Godfrey Isaacs announced December 18 that the Marconi Company would outfit aeroplanes employed in air passenger and mail service with wireless and would supply operators in the same way as it now serves ships. It also is intended to receive regular reports of air conditions in different localities and to circulate these for the information of the pilots. As every aeroplane will have either a name or distinguishing number, it will be possible to send telegrams from any part of the world or from any ship to an aeroplane. It is intended that this organization will be ready by the time the peace treaty is signed.

Arrangements recently have been made for the erection of wireless stations in the extreme parts of China, one on the frontier of Cashmere and another on the Chinese side of Siberia. Mr. Isaacs has arranged with Handley Page for the transport of the necessary machinery by one or more of his big machines. The journey inland will take two or three days in place of the same number of months.

583 Bombs Dropped in Paris Air Raids

PARIS.—Figures are now made public regarding the air raids and long range cannon bombardment of Paris, exclusive of the suburbs.

In 1914 forty-five bombs were dropped; in 1916, seventy, sixty-two of them March 20; in 1915, sixty-one and in 1917, eleven. During the last ten months of the war there were 1,211 casualties from 395 bombs. The total number of bombs dropped was 583.

Aeroplanes and Zeppelins dropped 228 bombs August 6, killing two persons and injuring 392.

Gen. Rhodes Out Soon

PARIS, Dec. 25.—The condition of Major General Charles D. Rhodes, head of the American Armistice Commission, who was injured in the fall of an aeroplane near Paris on Monday, continued to show improvement today. Unless unforeseen complications occur his complete recovery may be expected shortly.

British Air Force Merged in Army

LONDON, Dec. 13.—The Daily Express understands that Lord Weir has resigned his position of Secretary of State for the Air Forces. The Royal Air Force will cease to rank with the navy and army as a separate organization, and will in future be administered by the War Office as a branch of the army.

Framing Rules for Peace Flying

LONDON, Dec. 18.—The civil aerial transport committee has rejected the ancient claim that the owner of the soil has a right to the air above that soil. Without the repeal of that right the development of peace time flying would hardly be feasible.

It will be necessary in the future to frame air road rules and to make traffic regulations for the sake of public safety and the protection of the national interests. When the rules of the air road are compiled, the experience of the flying men will be found of value. The regulations for "taking off," and matters as to precedence, pace, and landing will have to be observed if accidents are to be avoided. The rules in existence as to doing stunts and low flying will probably be enforced. That different kinds of traffic will be directed to travel at different altitudes is a foregone conclusion. Aircraft meeting or overtaking each other will be ordered to allow a wide margin of safety.

It is possible that captive balloons containing air police may be stationed at specially selected spots. To the balloons may be attached sign posts giving directions as to distances to various places and fog horns in case of mist. Wireless telephones lighted at night as are lighthouses would guide the night fliers. Perhaps the cables of the balloons would be illuminated at intervals. The possibility of huge floating landing stages at which a machine could land or could be moored for making minor adjustments and repairs or refueling are not remote.

Will Confer On Air Rules

PARIS.—Representatives of several Allied powers and the United States will hold a conference in Paris early this year to consider the future of international aerial navigation, the *Echo de Paris* announced. Great Britain, Italy, Belgium, France and the United States will be represented at the conference, which will study the questions of how to prevent aeroplanes of different nationalities from crossing customs barriers and how to prevent postal or commercial aeroplanes from being transformed into bombing machines within a few minutes.

The result of the deliberations of the conference, the paper adds, will have to be accepted by Germany and her former allies in the peace treaty.

War Profiteers Use Aeroplanes to Take Booty Out of Germany

MUNICH, Dec. 26.—An Associated Press dispatch says that the *Munich Post* today prints a statement that German war profiteers, unable otherwise to get their booty out of the country, have resorted to the use of aeroplanes.

According to the newspaper, several aeroplanes have taken securities of enormous value from Frankfort to Switzerland.

The *Post* urges the government to seize capital where it is available, especially in banks.

3,950 Mile Air Flight Ends

LONDON, Dec. 19.—The Air Ministry announces the landing at Calcutta of Major General Salmon, whose flight from Cairo to Delhi in a Handley Page machine was announced on December 13. This aeroplane previously had been flown in England and took an active part in the final operation against the Turks on the Palestine front.

The total distance of the route from Cairo to Calcutta, via Damascus, Bagdad, Bushire, Bandar Abbas, Cbarbas and Karachi, is about 3,950 miles, the last stage, from Delhi to Calcutta, measuring 750 miles.

The Handley Page machine "Cartbusian," piloted by Major MacLaren, in which General MacEwen is flying from London to India, has reached Pisa.

DELHI, INDIA, Dec. 20 (delayed).—The time occupied in actual flying by the Handley Page aeroplane from Cairo to Delhi was 47 hours 21 minutes for a distance of 3,233 miles, according to a special dispatch to the New York *Sun*. The longest stage of the flight was from Damascus to Bagdad, which was 495 miles, and occupied 6 hours and 53 minutes. The next longest was from Karachi to Nasirabad, a distance of 485 miles, which was made in 6 hours and 35 minutes.

A curious incident occurred when a rat came on board at Charbar and was heard nibbling at the machinery. The animal's career was terminated by falling out of the plane at a height of 7,000 feet above the sand of the desert.

Conversion of War Aircraft

LONDON.—The attention of experts is now focused upon the matter of the conversion of war aircraft for mail and passenger carrying purposes. Once the impediment of war bombs, racks, guns, fittings, and other parts is shed, it is obvious that a large amount of lifting power will be released for passenger carrying, and that plenty of space will be left for comfortable accommodations.

Little is said, however, of the possibilities of the seaplane or the flying boat as a pleasure craft. Either the seaplane or the flying boat is capable of holding from six to a dozen people. It could be purchased and run at a far less cost than a modern yacht for cruising around the coast.

Americans Get Sixty Aircraft from Germans

COBLENZ, Dec. 27.—Sixty aeroplanes of the Fokker type arrived in Coblenz today by special train from Berlin. They were the first of 200 aeroplanes which are to be turned over to the American forces in Coblenz in accordance with the armistice.

Each machine occupied a flat car and a German soldier guarded each car. A number of German aviators also arrived to try out one out of each twenty machines before the planes are turned over to the American commission. The planes for the test will be selected by the Americans and the Germans will make the flights to show that the machines are in good condition. The flights will take place near Coblenz in the presence of American officers.

Slayer of Quentin Roosevelt Found

WITH THE AMERICAN ARMY OF OCCUPATION, Dec. 28.—Christian Donhauser, a youthful German aviator, who claims to have defeated Lieutenant Quentin Roosevelt, son of Colonel Theodore Roosevelt, in the fight in the air in the region of Chamery, which resulted in the death of young Roosevelt, today told the correspondent that the day following the combat his commander informed him the American he had downed was Roosevelt. Immediately afterward German aviators began arranging the details for the funeral of Lieutenant Roosevelt.

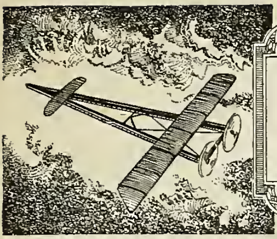
Before the war Donhauser was an aviator, although now he is only 23 years old. He is the smallest of the German aviators, weighing only 94 pounds. Soon after the war began he entered the service as an observer, serving on various fronts, but principally on those in France and Belgium. He began pursuit flying July 1, and between that time and the day the armistice was signed he had to his credit thirty planes downed. He wears the Iron Cross and other German decorations. The aviator is credited with twelve planes downed in eleven consecutive days.

Donhauser's home is Hamburg, but before the war he spent several years in London. Although still in the German army Donhauser is planning a trip to the United States. Furthermore, he says he hopes eventually to take out American citizenship papers and join the American aviation forces.

Norway Enters New Industry

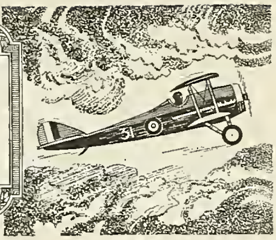
As has been the case in most countries, the efforts which industry has made in Norway to help itself and become independent of foreign markets have had great results. One of the main centers of this great industrial revolution is the district around "Sognefjorden," with its 100-mile water basin. During the past two years a new Norwegian industrial city has been built here. When all the new plants are running normally they will be Europe's largest aluminum producers.

A French "Salmson" two place combat machine



ELEMENTARY AERONAUTICS *and* MODEL NOTES

By John F. McMahon



CLUBS

PACIFIC NORTHWEST MODEL AERO CLUB
921 Ravenna Boulevard, Seattle, Wash.
BAY RIDGE MODEL CLUB
8730 Ridge Boulevard, Bay Ridge, Brooklyn
INDIANA UNIVERSITY AERO SCIENCE CLUB
Bloomington, Indiana
BROADWAY MODEL AERO CLUB
931 North Broadway, Baltimore, Md.
TRIANGLE MODEL AERO CLUB
Baltimore, Md.
NEBRASKA MODEL AERO CLUB
Lincoln, Nebraska

DENVER MODEL AERO CLUB
2820 Raleigh St., Denver, Colo.
BUFFALO AERO SCIENCE CLUB
c/o Christian Weyand, 48 Dodge St., Buffalo, N. Y.
THE ILLINOIS MODEL AERO CLUB
Room 130, Auditorium Hotel, Chicago, Ill.
SCOUT MODEL AERO CLUB
304 Chamber of Commerce Bldg., Indianapolis, Indiana
MILWAUKEE MODEL AERO CLUB
455 Murray Ave., Milwaukee, Wis.

CONCORD MODEL AERO CLUB
c/o Edward P. Warner, Concord, Mass.
MODEL AERO CLUB OF OXFORD
Oxford, Pa.
CAPITOL MODEL AERO CLUB
1726 M Street, N. W., Washington, D. C.
CORRESPONDENCE MODEL AERO CLUB
320 N. Main Street, Rockford, Ills.
AERO CLUB OF LANE TECHNICAL HIGH SCHOOL
Sedgwick & Division Streets, Chicago, Ill.

A piece of 2½ x 1" ash is stretched from the apex of the "V's" and acts as a compression strut when the bracing wires are drawn tight. The wheels are set 4 feet apart, the thickness of the axle being determined by the size of the hubs of the wheels.

Four plates are fastened to the apex of the "V's" of the landing chassis. These plates are made of 3/32" steel sheet. The slot is for free movements of the axle up and down.

THE motor is the most important part of the aeroplane, and we should be sure to have it work perfectly before installing it in our machine. To do this it is necessary to give the engine a good block test before using it.

It does not matter how old the motor is, in fact, the older Fords were made lighter in weight.

If we select an old motor, the first thing we must do is to re-bore the cylinders to make them perfectly round. It is not necessary to bore them out much larger than they are now, only get the scratches, scores, or pits out of the walls. If the reader cannot do this work, or if he does not think he could do a good job, I would advise sending the motor block to some good machine shop and have the work done right.

When the cylinders are finished, Alluminium Alloy Pistons should be fitted in place of the other old cast iron pistons. These pistons can be purchased from The Walker M. Levitt Company, 415 East 23rd Street, New York City, and they sell for $24.00 per set. The pistons weigh 15 oz. each.

The valve seats should next be inspected, and if they show any roughness or unevenness they should be ground and new valves fitted.

The connecting rods must be lightened by drilling holes of different sizes, small holes through the smaller section and larger holes through the larger section. When holes are drilled, the rods should be weighed and balanced. Some rods weigh a few ounces more than others. In this case it is necessary to grind the burr off the side of the heaviest rods until the weight is equal to the smaller ones.

The bearings of the connecting rods should be in perfect condition, and if necessary new bearings fitted.

The crankshaft must be trued up and the crankshaft bearings adjusted. It is necessary to cut the front bearing away on the outside as well as the small gear on the crankshaft. This is done to enable us to get a thrust bearing in between the pinion gear and the bearings to take the pull of the propeller when in flight. The space necessary is ⅝", and a two piece ball thrust bearing of light weight can be used. This can be purchased from any auto supply house.

Four 3/16" holes should be bored in the crankcase at points exactly in the center of the line of crank throw travel. These holes are made in order to allow us to run a force oil line to these points.

The oil pump can be purchased from the M. L. Oberdorfer Brass Company, 154 Nassau Street, New York City, represented by Mr. M. M. Rountree, who sell a very powerful and light gear pump. The pump only weighing one and a quarter pounds. This is attached to the front of the motor and is connected directly to the bottom of the crankcase. This allows the pump to be primed out at all times. The outlet consists of a piece of 3/16" O. D. copper tube with branches solder with silver solder. These branches are four in number and are inserted into the holes in the crankcase, to allow the oil to squirt on the bearings.

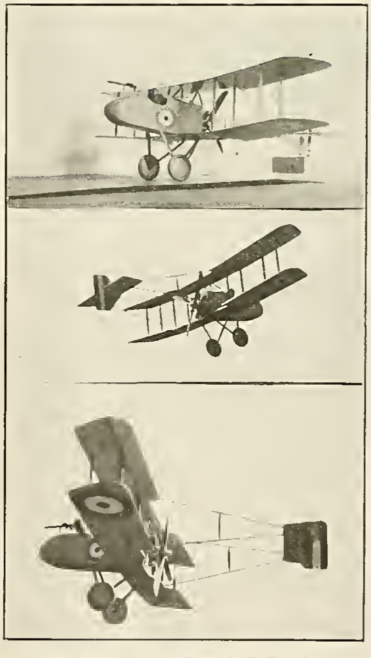
A new oil retainer must be made because we must cut off the fly wheel transmission, etc., from the rest of the motor. This eliminates the bottom of the oil crankcase, and, of course, a new one must be made from heavy aluminium. The cover plate for the timing gears must be made from aluminium also.

When the fly wheel is removed, we will find a flange at the end of the crankshaft. It is necessary to have a hub made to the same size of the flange, with an extension and a hub for the propeller fastened to it. This should be done at a good machine shop.

A Zenith Carburetor should be fitted to the engine. The Zenith Company makes an aluminium manifold which is very light, and the whole combination presents a very good looking job.

The valves should be timed late, that is, set the inlet valve of No. 1 cylinder to start opening just as the piston reaches a point of ⅛" below top center on its down stroke.

The water outlet in the head of the motor must be changed around because the motor is now turned in the opposite directions. It is necessary to plane off the old outlet and weld on a flat iron plate, or to close up the opening with a plate. Then weld an elbow into the outlet facing the reverse to what it does now. The inlet to the motor block from the radiator must be changed as well.



A scale model of the British F E 8 Pusher. This model was constructed of wood and it has a small rotary motor and a four bladed propeller

Aeronitis

Aeronitis is a pleasant, a decidedly infectious ailment, which makes its victims "flighty," mentally and physically. At times it has a pathologic, at times merely a psychologic foundation. It already has affected thousands; it will get the rest of the world in time. Its symptoms vary in each case and each victim has a different story to tell. When you finish this column YOU may be infected, and may have a story all of your own. If so, your contribution will be welcomed by your fellow AERONUTS. Initials of contributor will be printed when requested.

An Aviator's Alphabet

A—is the air man who looped the Hun-guffin,
For his own pleasure. (He is now in his coffin.)
B—is the batman who dirties the quarter,
Ruins our boots, and forgets our hot water.
C—is the Castor the rotaries use,
It bucks up both engines and humans—excuse.
D—is the drift, if you land with it on,
You will, almost at once, realize you are wrong.
E—is the engine which causes the motion
Which gives you the lift (not caused by promotion).
F—is the fairy you love with a pash,
She is sure to be there on the day that you crash.
G—is the gas which makes things go roun',
And sometimes does not, in which case you come down.
H—is the hangar one greets with such smiles,
On return from a run of some ninety-odd miles.
I—is the incidence out on each plane,
From which you get lift, I need hardly explain.
J—is the joy-stick—I mean control lever—
Which the Hun always clings to, as if in a fever.
K—is keel surface, it stops you from spinning,
Perhaps, if you know when the spin is beginning.
L—is the loop you're intending to do,
If the wind will do down, and the sky get blue.
M—is the man who keeps crashing on landing,
Why he flattens out, passes all understanding.
N—is the nacelle of a fast pusher scout
Twixt you and the earth, if you crash there is naught.
O—is hot oil, when it gets in your eyes
You will surely wear goggles at last and be wise.
P—is the prop which makes sticks which are sold,
It has other uses as well, I am told.
Q—is for Quirk, a machine of stability,
Of peculiar design, but unbounded utility.
R—is R. A. F., who designed a machine,
And an engine as well, such as never was seen.
S—is for stunting, if down near the ground
It is stupid and silly and grossly unsound.
T—is the tarmat I stand on all day,
And hope for a chair in an optimist's way.
U—is the union of pipe and of tank,
When the union gave out the aeroplane sank
V—is the vickers gun, gruesome affair,
Used to wind up the Hun in the air.
W—is wash-out and wash-in as well,
Their meaning's a secret I hardly can tell.
X—is the pilot, whose glory and fame
We'll remember in England, tho we don't know his name.
Y—is the yell of a man (or its echo)
When this engine's gone dud on a long-distance recco.
Z—is the letters of letters, my friend,
It involves the word Zeppelin (this is the end).

—The Aeroplane.

Real Grit!

Pullman Attendant (*to sleeping aviator home from the front on short leave*): "Reading, sir!"

Aviator (*rausing up*): "Ready? Right ho." (*Switches on the electric light.*) "Contact!"

Muzzling the Gas-bags

A Congressional debate on what shall be appropriated for aeronautics is a scheme for keeping people from finding out what they are talking about.

Antique Monoplanes

"For Sale: 40 year old hens."—*Blackburn Telegraph.*

The restaurant we went to the other day must have answered this advertisement.

At a Theatrical Lodgings

Servant (*rushing in, all excitement*): "Oh! Mum! The Zeppelins have come!"

Old Lady: "Well, tell 'em we've already let the rooms to the Brothers Egbert!"

Up-to-Date

The Aviator (*who has just fallen into a river*): "Lemme go I'm all right; I can swim."

The Girl: "I don't care. I'm going to save you. I want a medal."—*Chicaga Herald.*

Bungling Buglers!

The Eleventh June replacement detachment has a pup named Reveille and a cat named Retreat. Reveille gets 'em up on time and Retreat sounds for mess. The men call for Reveille, which is something out of the ordinary. Retreat sounds after taps. When Retreat and Reveille come together Reveille follows Retreat.

Oh, Hollow Fame!

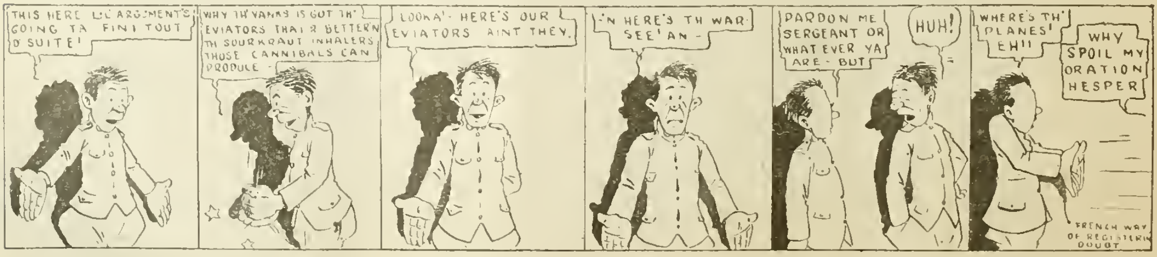
Lieut. S. B. Jacobson who heads the Kelly Field players was enjoying a production which he assisted in producing, and which was being shown at the Knights of Columbus hall. A rookie liked the show but was disturbed by a ray of sunlight which came through a window.

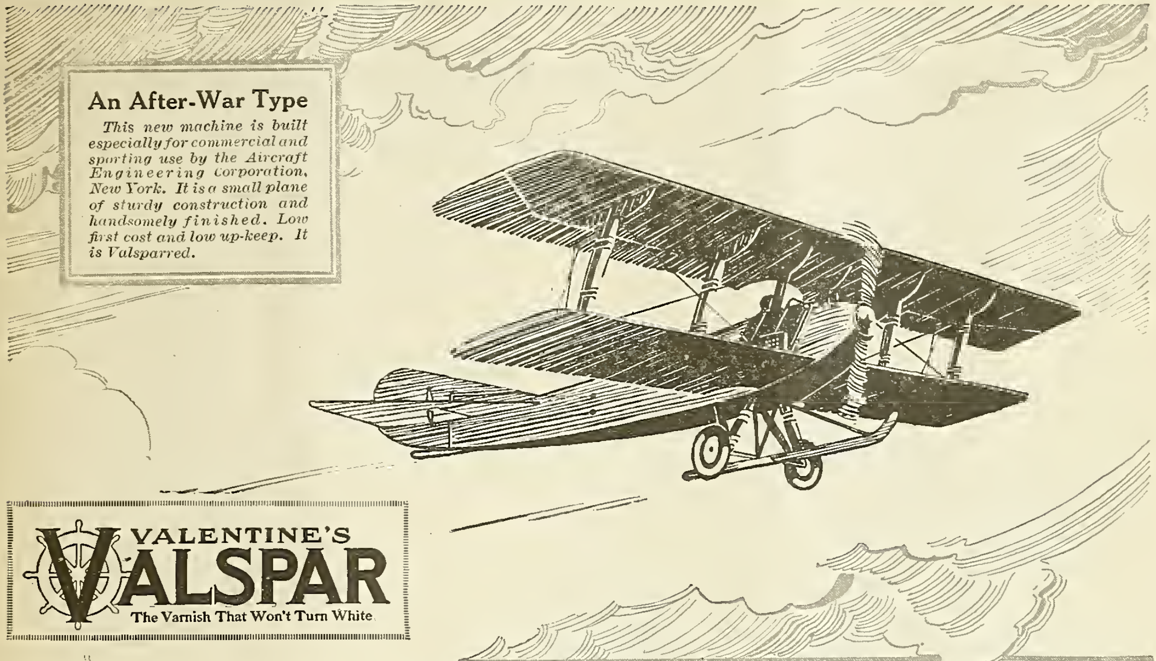
"Hey Kid," yelled the rookie to the officer, "pull down the shade."

Lieut. Jacobson complied with the request, and as he rose the loud-voiced recruit noticed the gold bars and the leather leggins. The soldier reduced himself to his minimum size and slunk out of sight.—*Kelly Field Eagle.*

OUI, THIS IS FRANCE

By "Alex"

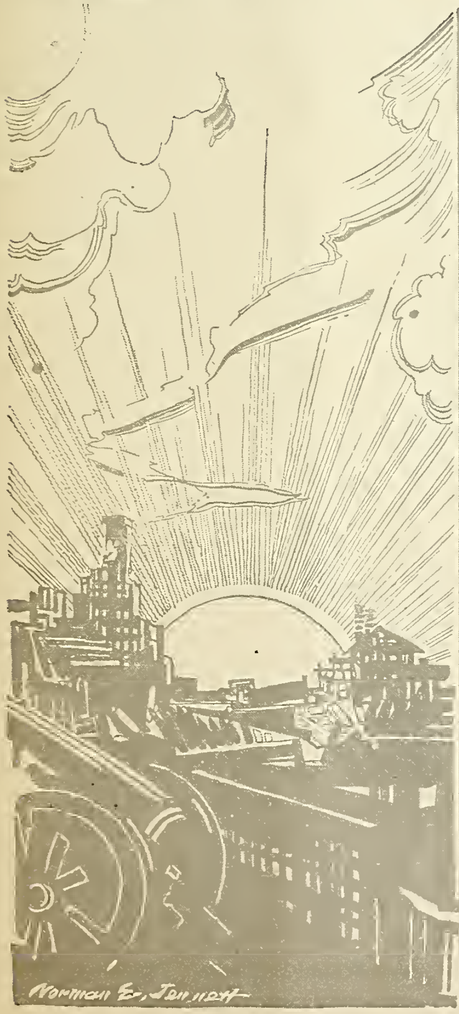

THIS HERE LIL ARGUMENT'S GOING TA FINI TOUT D' SUITE!
WHY TH' YANKS IS GOT TH' EVIATORS THAT R BETTER'N TH SOURKRAUT INHALERS THOSE CANNIBALS CAN PRODUCE -
LOOKA! - HERE'S OUR EVIATORS AINT THEY.
-'N HERE'S TH WAR SEE' AN -
PARDON ME SERGEANT OR WHAT EVER YA ARE - BUT
HUH!
WHERE'S TH' PLANES! EH!!
WHY SPOIL MY ORATION HESPER
FRENCH WAY OF REGISTERIN DOUBT



An After-War Type

This new machine is built especially for commercial and sporting use by the Aircraft Engineering Corporation, New York. It is a small plane of sturdy construction and handsomely finished. Low first cost and low up-keep. It is Valsparred.

VALENTINE'S
VALSPAR
The Varnish That Won't Turn White



The Airplanes of Peace are Valsparred—

In the air-fleets of America and the Allies throughout the war Valspar proved its supremacy as the most reliable and durable varnish for the wood, metal and fabric of airplanes and seaplanes.

With the coming of peace the development of the flying machine takes another turn, and Valspar is again the chosen varnish of the leading manufacturers.

Many new types of planes, one of the latest of which is shown here, are being produced. They are Valsparred of course.

Valspar is proof against all kinds of exposure to water, air, sun, mud and dust, and also against the terrific vibration of air service. It won't turn white under the severest conditions. It resists oil and gasoline, acids and alkalies. It is a long-oil varnish of exceptional brilliancy and drying qualities and retains its elasticity long after ordinary varnishes have perished.

We invite you to make your own tests. Our Airplane Service Department will gladly give you every possible assistance and information. To Purchasing Agents and Superintendents of Production, we will send our valuable book on airplane varnishing, free on request.

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Established 1832—*Largest Manufacturers of High-grade Varnishes in the World*

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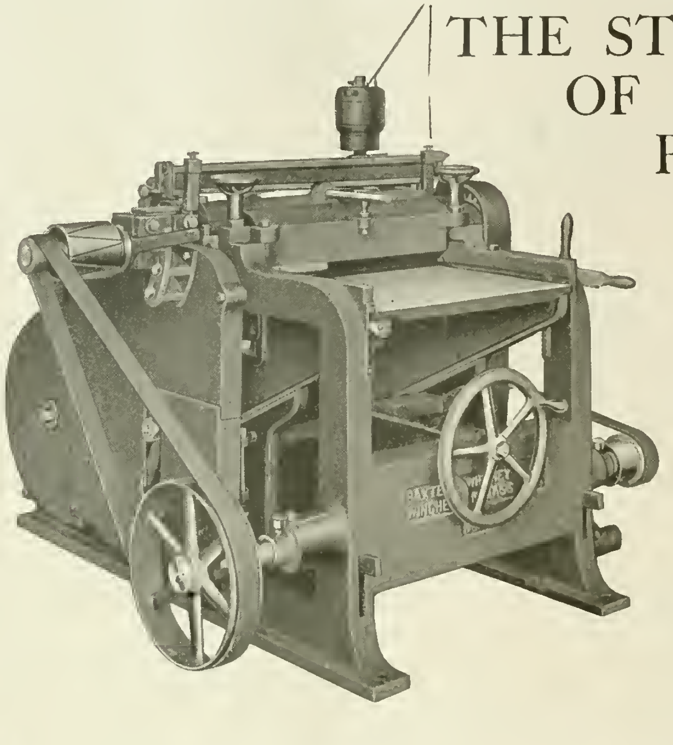

THE STRONG POINTS OF WHITNEY PLANERS

appeal to every wood-worker, such as a

RIGID FRAME with ample weight of metal—

BED raised and lowered on Solid Wedges operated on wide tracks—

HARDENED CENTER TABLE made extra thick—

AUTOMATIC CHIPBREAKER working concentric with the Cutter Head—

CLAMP CUTTER-HEAD BOXES easily removed from the machine— .

CUTTER HEAD with long bearings of large diameter.

These are but a few of the features that enable Whitney Surfacers to do superior surfacing at the lowest cost.

For further information write

Baxter D. Whitney & Son
Winchendon, Mass.

F. C. Cherry, Grand Rapids, Michigan, Agent for Michigan.
Jenkins Machine Co., Sheboygan, Wis., Agents for Wisconsin and Indiana.

The Hughes Aircraft Report

(*Continued from page* 865)

For Central American and Mexican mahogany:

	Minimum	Maximum
Huddleston & Marsh Mahogany Co.	1,750,000	3,000,000
Astoria Veneer Mills & Dock Co.	1,500,000	2,500,000
Lewis Thompson & Company	1,500,000	2,000,000
Otis Manufacturing Company	1,000,000	2,000,000
Frieburg Lumber Company	500,000	1,250,000
I. T. Williams & Sons	750,000	2,000,000
Palmer & Parker Company	300,000	750,000
C. C. Mengel & Brother	2,800,000	2,800,000

On April 16, the Aircraft Board recommended the making of a contract with the S. B. Vrooman Company for Central American or Mexican mahogany, 500,000 feet, minimum and 1,500,000 maximum.

It is hardly necessary to say that it was a gross impropriety for corporations or firms, either individually or collectively, to pay additional compensation to an employee of the Government, and for the employee to receive such compensation, for services in relation to contracts and transactions in which the corporations or firms were directly and pecuniarily interested. It is not found, however, that there is any statute making this a criminal offense unless it is a case within the statute against bribery, or proves to be part of a fraudulent scheme to take advantage of the Government, or part of an endeavor to induce a violation of law.

The Act of March 3, 1917 (*ante,* p. 25) making it a crime to pay additional compensation to an employee of the Government, or for an employee to receive such additional compensation, only applies to such contributions after July 1, 1919. The occasion of this statute, it is understood, was criticism of payments of additional compensation made to experts in the employ of the Government, where, however, the employee in the Government service was not acting in matters in which the person or corporation contributing had any pecuniary interest or motive of gain. Contributions for the support of those who have made sacrifices in undertaking war work for the Government are doubtless made in many instances, but there is no analogy between cases of this general description and payments of additional compensation to employees of the Government by those having direct pecuniary interest in the transactions in which the employee acts as the Government's agent. But under the statute against bribery (Criminal Code, Secs. 39, 117) it must be proved that the payment was made or received with intent to influence the decision or action of the representative of the Government on a question which may be brought before him in his official capacity or in his place of trust or profit, or to influence him to commit, aid, collude in or allow a fraud, or to make opportunity for the commission of a fraud, on the United States, or to induce the employee to do or omit to do an act in violation of his lawful duty. Whether in the present case, in the circumstances disclosed, any charge of this sort could properly be made would largely depend upon the question whether the terms and prices secured by the mahogany manufacturers were fair and reasonable, or could be deemed excessive and the result of improper influence. In view of the intimate relation of the representatives of the Government, who took part in the negotiations, to the manufacturers, it is obviously appropriate that there should be a fair and impartial examination of the transactions by a body competent to make a survey and determination of questions of costs and profits. Testimony has been given in the present inquiry tending to show that the prices were high. Lower prices under prior orders and offers are referred to. On the other hand, the manufacturs urge that in view of the peculiar conditions of the industry, the difficulties attending the procurement of logs, and the risks taken by reason of the small percentage of lumber suitable for propeller material, the prices and terms were in all respects fair; that Mr. Williams, Mr. Wickliffe, Mr. Vrooman and Mr. McCullough took their positions simply because of the necessity of having men in their respective places who were qualified by experience, and that throughout the transactions all the persons concerned have been moved solely by the desire to serve the Government. It was manifestly impossible in the course of the present inquiry to make such a survey of the mahogany industry as to reach a satisfactory conclusion with respect to the cost of producing the required mahogany and as to the fairness of prices and terms. This sort of investigation would require special facilities of the kind which are at the command of the Federal Trade Commission, and through its instrumentality it is believed that such a survey of the industry and a determination of fair costs and profits can be made. Upon its report as to the cost of producing the required mahogany it can readily be decided whether there is ground for prosecution by reason of the transactions which have been disclosed in this inquiry.

(*To be concluded*)

(*Continued from page* 850)

(3) To send up sounding balloons and explore the upper air of the Polar regions, gathering meteorological data.

Captain Bartlett gave further details of the work of his expedition as follows:

"Over 1,000,000 square miles of territory in the center of the Polar Basin still remain to be explored, and it is quite possible that we will find land in that region.

"During a period of time in the summer it is so warm that snow and ice disappear entirely in the sub-Arctic regions. I have a number of photographs which I took at Etah during my last expedition which shows that there was no snow left even on the Rookeries near Etah, where such birds as the Auks and Loons nest. The photograph of Cape Alexander, the Gateway of the Arctic, and Cape York, North Greenland, show that there was no snow left.

"It is hard to make people believe that there is a period of time in the Arctic regions when the weather is warm and there is vegetation. We picked flowers on some of our expeditions about 400 miles from the North Pole. But the warm weather only lasts for about two months, and ships are handicapped through the ice further north and are usually caught in the ice in the returning cold weather before we can get very far. With the aeroplane it is different. We can cover a good deal of ground in a very short time, and we can land on established bases at different points from which to make soundings to get data from the bottom of the Polar Basin as well as from the upper air, to ascertain the direction of air currents and other meteorological data."

Thomas
THOMAS-MORSE AIRCRAFT CORPORATION
CONTRACTORS TO THE U.S. GOVERNMENT
ITHACA, N.Y. U.S.A.

132 Army Fliers Released

San Diego, Cal.—Orders authorizing the discharge of 132 aviators and ground officers attached to Rockwell, Ream and East fields, were received December 26.

One of those to leave the service is Lieutenant William Wellman, of Boston, American ace in the Lafayette Escadrille.

Army Aerial Squadron Turn Southward Again

The War Department authorizes the following:

The four training planes coming east from San Diego, Cal., which reached Eufaula, Ala., from Montgomery, Ala., have turned south again headed for Florida. They were given permission to come to Washington, D. C., but requested that they be allowed to fly through Florida before coming north, and this consent being secured by wire, they started for Jacksonville. From there they will proceed to Arcadia. By reaching Jacksonville they will have completed a transcontinental flight, the first on record for formation flying.

None of these planes carries more than an hour and a half's supply of gasoline, being the planes in which cadets are taught to fly. They left the Pacific coast on December 4, each carrying two men, and have come steadily east in hops of one and one-half hour each, mapping the country as they went along for the purpose of laying out a southern transcontinental air route.

Y. M. C. A. Uses Aeroplanes as Secretarial Jitneys

Wash., D. C.—Y. M. C. A. secretaries who help supervise association work at a "down river" camp, have found a way of avoiding bad roads. They go in aeroplanes.

Upon invitation of the Navy Department, Charles N. Ramsey, in charge of personnel, and Ralph I. Hickok, religious work director, went in an aeroplane to Mackadoc, the lower station of the naval proving ground, about forty-five miles down the Potomac from Washington.

The secretaries made a survey preliminary to starting Y. M. C. A. work at that point where there now are about 200 men. They were the guests of Lieutenant Caldwell and Lieutenant W. J. Lee.

The "down river" trip took fifty-three minutes, and one hour and five minutes was required for the return trip.

Photo Section News

During the week the Photographic Branch of the Training Section reported that a mosaic containing 4,200 prints had been completed of Fort Sill. The whole map measures 8 by 16 feet. Mosaic maps of Venice were recently received from the Italian Mission.

There were on December 21, a total of 482 cadets attending the protographic schools at Cornell and Rochester.

Air Service in Santa Role

Some sixty wounded soldiers stationed in Washington were made happy on Christmas by the donations of the officers and employees of the D.M.A. and the B.A.P., amounting to $210.68.

Christmas morning an Army truck laden with sixty well-stuffed Christmas stocks, and packages of tobacco, books, fruit, candy, note paper and a dozen other things, as well as twenty-five out of town, and more or less lonesome girls, drew up at Wards 1, 2, 3 and 4 at Walter Reed Hospital, and Christmas for the boys confined to their cots began in earnest.

This little Christmas party was made possible by the activities of Mrs. E. R. Boughton, of the Finance Branch of the D.M.A., mother of Captain W. E. Boughton of Camp McClellan. Mrs. Boughton herself collected the money, and it is interesting to know that while she only asked for nickels, quarters, halves and even dollars were donated by the Air Service for use in this worthy project.

Major Peterson Returns

Major David McK. Peterson, A. S., A, Junior Military Aviator, and formerly of the 94th Aero Squadron, with a fine record behind him in the Lafayette Escadrille, returned from overseas in November. Major Peterson was detailed in the Training Branch of the D.M.A., and was recently transferred to Dorr Field, as Officer in Charge of Flying. Major Peterson's home is in Honesdale, Pa. He has received the American Distinguished Cross and an Oak Leaf, and some French decorations for his service overseas.

D. M. A. Board on Peace Times Organization

The Board appointed by the Director of Military Aeronautics to work out a Peace Times Organzation for the Air Service has announced its personnel and the functions of its Sub-Boards to be as follows:

Board of Organization

Colonel C. G. Edgar, Colonel F. R. Kenney, Colonel A. Woods, Major E. Huhert Litchfield, Recorder.

Operating under this Board are the following Sub-Boards:

Demobilization of the Division of Military Aeronautics

Lt. Colonel George B. Hunter, Chairman; Lt. Colonel Rush B. Lincoln, Major Walter George Rogers.

Air Service Operations in Peace Times

Colonel William E. Gillmore, Chairman; Colonel Gerald C. Brant, Lt. Colonel Thomas Duncan, Lt. Colonel Barton K. Yount, Lt. Colonel Colonel Ira Longanecker, Lt. Colonel Benjamin F. Castle, Captain John W. Davis.

Mustering Out

Major E. Hubert Litchfield, Chairman; Lt. J. J. O'Brien.

Committee on Training

Colonel Milton F. Davis, Chairman; Lt. Colonel John Armstrong Drexel, Lt. Colonel Seth W. Cook, Major William A. Rohertson, Professor Edward L. Thorndike.

Invention and Research

Captain Adelhert Ames, Jr., Chairman; Captain Rohert R. McMath, Professor Wallace C. Sahine.

Supply

Lt. Colonel Thomas G. Gallagher, Chairman; Lt. Colonel Harold Bennington, Major C. S. Benton, Major Walter G. Rogers, Major Eugene E. Deacon, Major Harold R. Eyrich, Captain David R. Wheeler.

Demobilization

The Officer in Charge of Demobilization announces recently that reports from all Air Service activities show the following preferences on the part of the personnel, both commissioned and enlisted:

One-eighth request complete separation from the Service.

Three-eighths request to enter the Regular Army.

One-half request to enter the Reserve Corps.

Here It Is—The Practical Aeroplane

READY FOR IMMEDIATE DELIVERY

Designed for civilian use—for the man who rides his ranch, and the man who loves the air—regardless of the business that calls him.

Low
in
Cost of
Upkeep

High
in
Factor of
Safety

Dispatch Model, $2,500 f.o.b. factory

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N. W. DALTON, Chief Engineer................2 East End Avenue
HORACE KEANE, Sales Manager.............220 West 42nd Street

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Broadway and 50th Street, New York

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MOBILIZED FOR VICTORY AND DEMOCRACY
SINCE 1909

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built and based on efficiency, are with the winning forces. In the fight for democracy our product is Ace High. Four plants. Total floor space 164,132 ft.

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Spencer Heath, Pres. **BALTIMORE, MD.** **J. M. Creamer, Vice-Pres.**

BERCKMANS
AIRPLANE CO.
NEW YORK CITY U.S.A.

(*Continued from page* 867)

Larsch, Joseph F.	RWT
Lockwood, Lyman B.	HHN
Leitner, Clarence W.	GLC
Leigh, Kenneth G.	CAF
Lahey, William P.	EOT
Lenihan, Thomas J.	FLA
Lawrence, Millard Choate	PMT
Loher, Clarence Beaver	ABC
LaParle, Walter E.	RSD
Lyons, Edward T.	EOT
Layne, Edward G.	EOT
Lucas, Malcolm	DMA

M

Maranville, Clarence H.	FRF
Mosher, Hugh E.	FLA
Maxwell, Geoffrey C.	FLA
Matson, David Hase	SLA; LHV
Malloway, Jesse S.	DMA
Mulvihill, Mead J.	DMA
Michael, Berkeley S.	LDT
Minter, Hugh Cromer	SLA; SMM
Moore, Joseph F.	FLA
Myers, Clarence G.	EOT
Moore, Lewis E.	FLA
Mitchell, Thomas Franklin	SLA; LHV
Mahoney, Augustine Francis	SLA; LHV
Murphy, Glenn Ross	SLA; SMM
Morris, John Paul	FLA
Morris, Howard D.	HHN
Mills, Harry H.	CAF
Meyer, Charles Louis	CAF
Myers, Ray G.	EOT
Moore, James	DMA
Meredith, Russell L.	DMA
Menkel, William	Note 5
Marr, Kenneth	RSD
Metcalf, Thomas N.	DMA
Monger, Walter V.	EOT
Moon, Charles M.	RSD
Miller, Heber C.	EOT
Morris, Glenn D.	RSD
Mowry, James B.	CRI
Mars, James A.	DAP
Moore, Walter F.	RSD
Muncie, Floyd H.	RSD
Minter, Hugh Cromer	SLA; SMM
Massey, Bert V.	RSD
Mook, Harold F.	RSD
Mann, Merrill D., Jr.,	DMA
Moon, Ruthven K.	EOT
Miller, Royal M.	EOT
Murphy, Glenn Ross	SLA; SMM

Mc

McGough, William J.	SLA; SAG
McCutchen, Vernon Ingersol	SLA; SMM
McNaul, Hollis Olin	SLA; LHV
MacRae, Harry B.	CAF
McNulty, Peter H.	CPA
McCarty, Jack	SLA; LHV
MacIntyre, Duncan Lauchlan	SLA; LHV
McAvoy, William H.	PWM
McKinstry, Augustus T.	RSD
MacKey, George B.	RSD
McTaggart, James M.	SLA
McCullough, Joseph H.	GLC; WDM; Note 1
McKittrick, Roy Emerson	SLA; SMM
McDonough, Andrew L.	EOT
McGill, Raymond J.	RSD
McGowan, George J.	EOT

N

Newhall, Edward	SLA; LHV
Nester, Howard Waltham	CPA
Newcomb, Walter D.	CJW
Nimocks, Alfred B.	CPA
Newberry, Hawley D.	EOT
Newman, Samuel H.	EOT

O

O'Sullivan, John Reilly	SLA; SMM
O'Brien, Fred Flattery	SLA; SMM
Owens, Robert L. W.	FLA
O'Leary, Dorman	KST
Ordway, Lucius P.	HHN
Owen, Richard Lewis	SLA; PWM
Older, Fred R.	EOT
O'Brien, Bernard J.	RSD

P

Pitkin, Loren H.	KST
Patterson, Robert W.	DAF
Pease, Robert Alvaro	SLA; LHV
Place, Charles Irving	SLA; LHV
Payne, Richard Hammond	SLA; LHV
Pike, John	FLA
Powell, George Newett	SLA; LHV
Peterson, Glenn	FLA
Phillips, Clay A.	CPA
Price, Neil	SLA; SMM
Puryear, Alfred L.	FLA
Porter, George H.	Note 5
Pingenot, Augustus C.	EOT
Putnam, Marion G.	LDT
Parker, Earl K.	RSD
Perlman, Samuel G.	RSD
Provosty, Albin A.	EOT
Pinckney, Dunbar W.	EOT
Prosser, Harvey W.	RSD
Pinckney, Francis M.	RSD
Patterson, Lyman	RSD
Price, Albert A.	RSD
Perrin, Elmer D.	RSD
Pickup, Christopher V.	RSD
Price, Neil	SLA; SMM

R

Raiguel, William O.	EOT
Russell, Everette P.	CJW
Roup, Glenn Marion	SLA; SMM
Rohrer, Francis Sheppard	SLA; LHV
Riley, William Edward	ABC
Ryan, Robert E.	CAF
Roberts, Lloyd Southwick	SLA; LHV
Robbins, Oliver K.	EOT
Rawlins, Albert Whiteley	SLA; LHV
Rhodes, Lewis Boling	SLA; LHV
Rozar, Foster R.	FLA
Ryan, David L.	DMA
Reid, Walter H.	KST
Robertson, Lawson	Note 6
Reynolds, James T.	EOT
Roddy, Norman Lee	SLA; SMM
Robinson, Fernando A.	RSD
Roup, Glenn Marion	SLA; SMM
Reid, Ted	EOT
Roeder, Frank E.	RSD
Rivers, Harold R.	RSD

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Smith, Charles Daniel	SLA; SMM
Slate, Everett Joseph	SLA; SMM
Sedgwick, Robert, Jr.	DMA
Sturtevant, James Alvin	SLA; LHV
Schermerhorn, Howard Fera	SLA; LHV
Stout, Carter W.	SLA; LHV
Scott, Roger McCormick	SLA; LHV
Soule, Edgar	OMA
Sanchez, Julius	SLA; LHV
Smith, Walter James	DAP
Stenson, Irving C.	LOT
Speed, Frederick Rice	CPA
Street, Theodore Emerson	SLA; SMM
Sillers, Alexander Graham	SLA; SMM
Story, Robert Earl	SLA; LHV
Sheridan, James Edward	SLA; LHV
Shreve, Lemuel Morse	SLA; SMM
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Smith, Lewis A.	FLA
Stevens, Louis W.	CPA
Suydam, James	CPA
Smart, Oliver M.	DMA
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Scott, Henry Thomas	PFO; DAP; Note 1
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Sillers, Alexander Graham	SLA; SMM
Smith, Edward T.	WFO
Shreve, Lemuel Morse	SLA: SMM
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Slate, Everett Joseph, Jr.	SLA; SMM
Sanderford, John R.	RSD
Severson, Thor J.	RSD
Smith, Charles Daniel	SLA; SMM
Snow, George W.	RSD

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Tucker, McKendree	CAF
Turner, Lawrence E.	SLA: SMM
Thode, William Henry Banga	SLA; LHV
Thebaud, Louis B.	FLA
Turpin, Paul R.	GLC
Taylor, Alfred B.	RSD
Todd, Clarence W.	RSD
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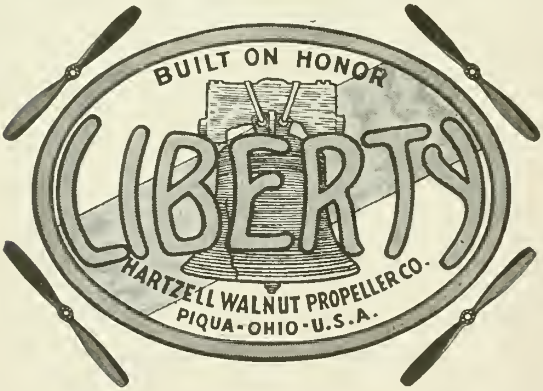
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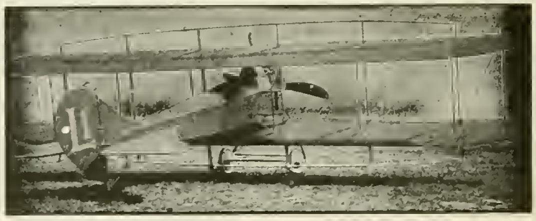

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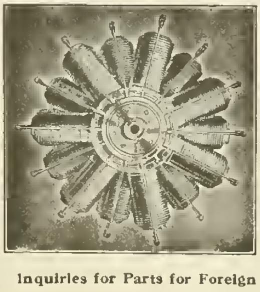

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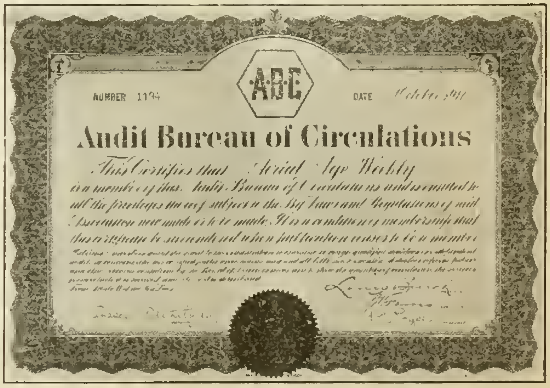

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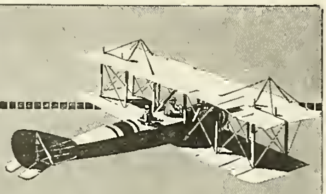

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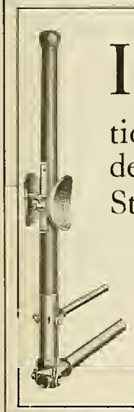

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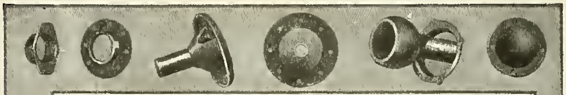

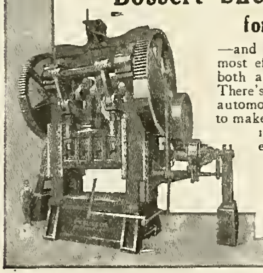

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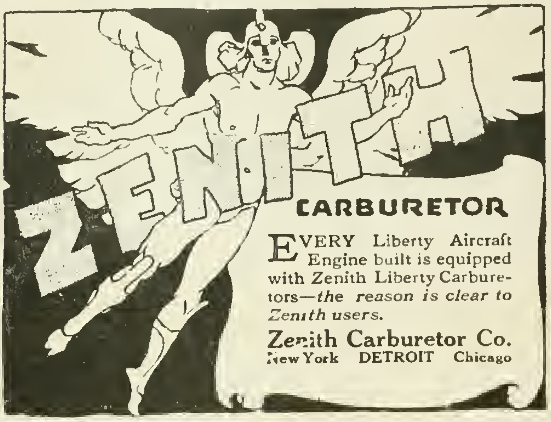

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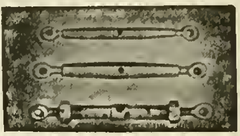

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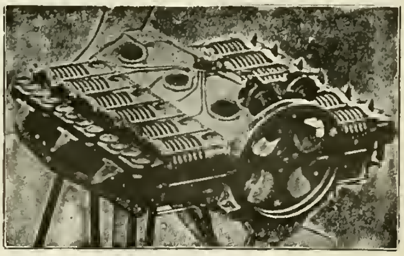

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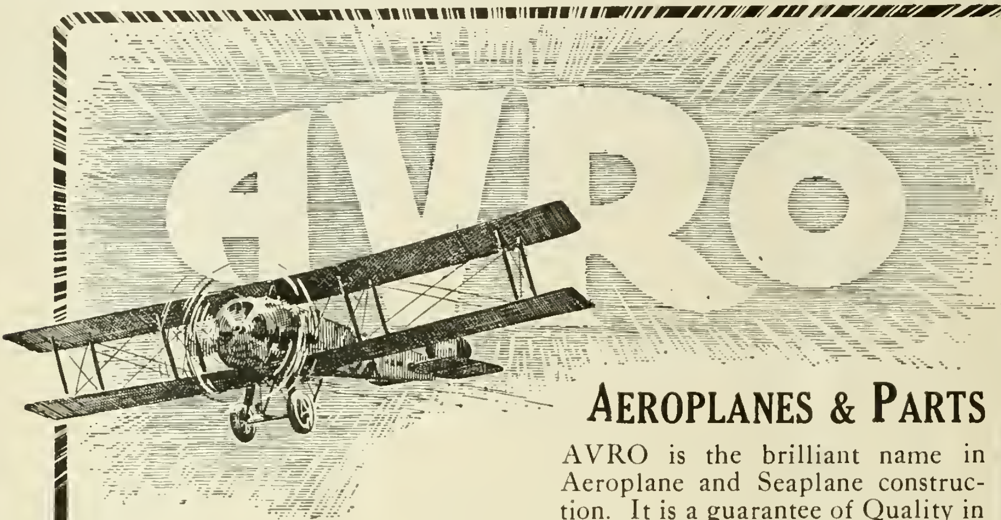

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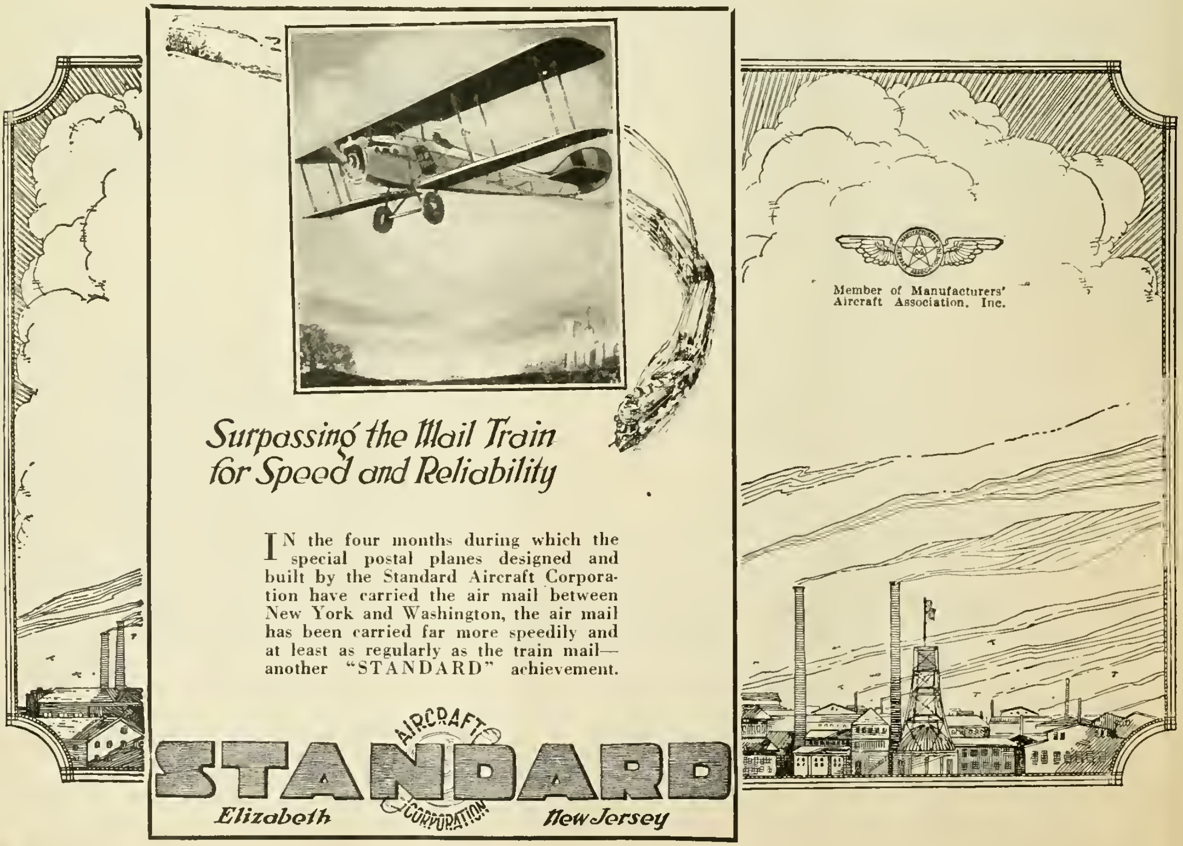
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AERIAL AGE WEEKLY

Vol. 8, No. 20 JANUARY 27, 1919 10 CENTS A COPY

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Aerial Transportation in the United States and Elsewhere

The Duesenberg Model H Aero Motor Described

PUBLISHED WEEKLY BY THE AERIAL AGE COMPANY, INC., FOSTER BUILDING, MADISON AVENUE AND FORTIETH STREET, NEW YORK CITY
Subscription: Domestic, $4. Foreign, $6. Entered as second-class matter March 25, 1915, at the Post Office at New York, under the act of March 3rd, 1879

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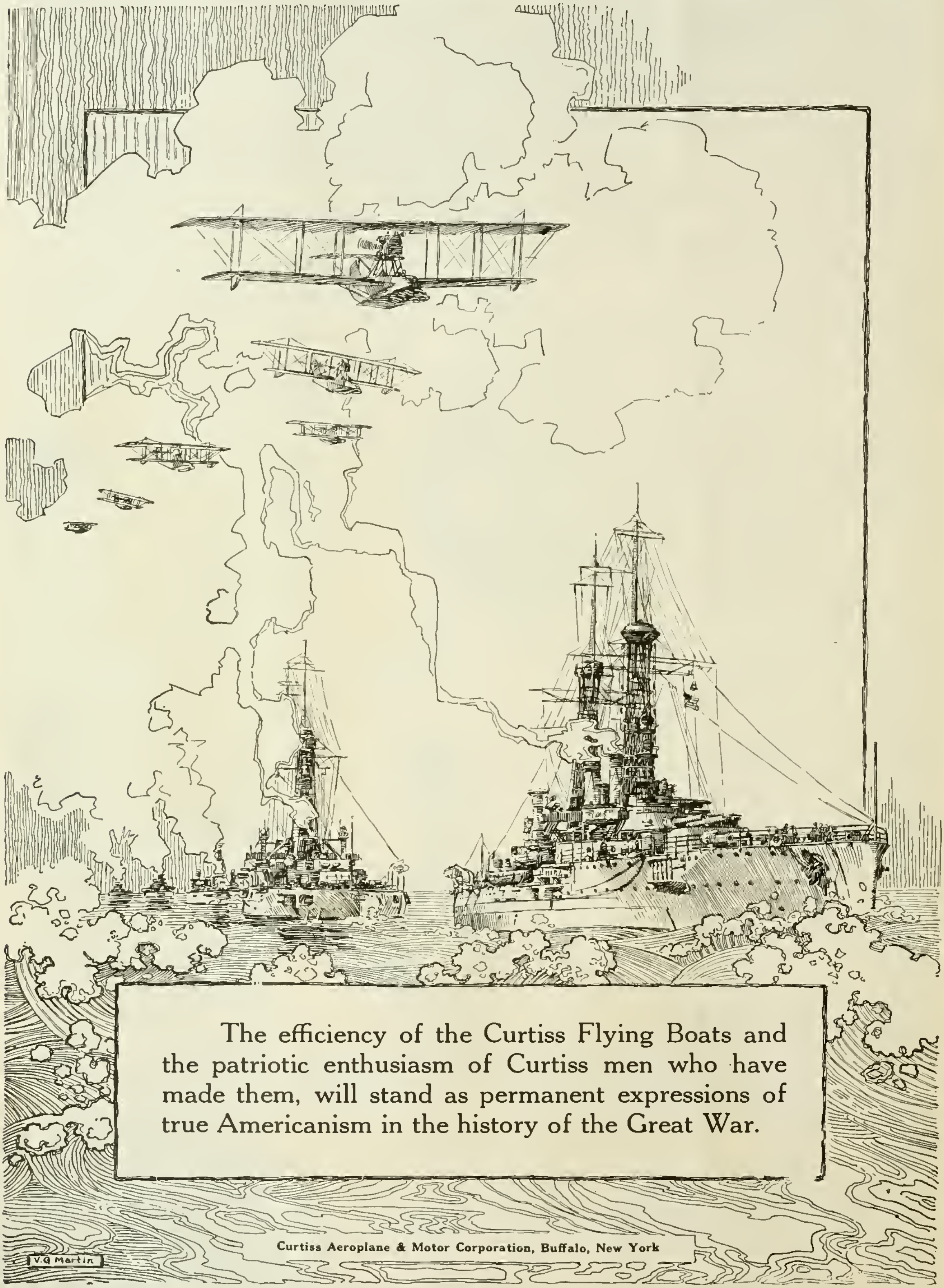

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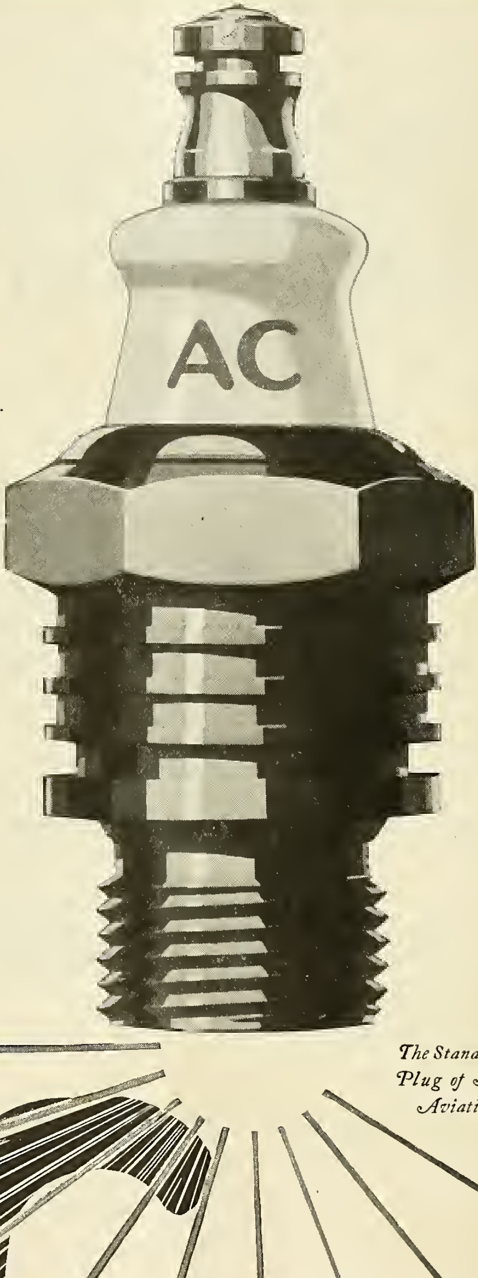

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AERIAL AGE
WEEKLY

Vol. VIII JANUARY 27, 1919 No. 20

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Entered as second-class matter March 25, 1915, at the Post Office at New York, under the act of March 3rd. 1879

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of the

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VOL. VIII NEW YORK, JANUARY 27, 1919 NO. 20

AERIAL TRANSPORTATION IN THE U. S. AND ELSEWHERE

As Aerial Age goes to press the energetic Captain Benjamin B. Lipsner is concluding the arrangements for the purchase of a number of large planes, each capable of carrying forty passengers.

This is as important an event in the history of aeronautics as was the placing of the first order for an aeroplane by the United States Army in 1907 or by the Navy in 1911 or by the Post Office last spring.

It is an epochal event. The example will be followed. We may expect that scores of concerns will be organized during the coming year to establish aerial transportation lines.

The coming Aero Show being organized by the Manufacturers' Aircraft Association, which has the support and cooperation of the Army, Navy, Aero Club of America and Aerial League of America, will do much to stimulate interest in aerial transportation. So will the aeronautic events being planned by the Aero Club of America and Aerial League of America.

The War and Navy Departments are to cooperate with the Manufacturers' Aircraft Association in the aeronautical exposition which the association is to hold in Madison Square Garden and the 69th Regiment Armory.

Cooperation was asked of the officials at Washington, and as a result Army and Navy representatives were sent to New York with lists of prospective exhibits. Great interest will be created by the exhibiting of the large Navy flying boat, the NC-1, which is capable of carrying fifty passengers, and which may attempt the passage of the Atlantic. The Army group includes a Handley-Page and a Caproni. In addition there are a number of captured German 'planes and a large quantity of trophies.

Other countries are going ahead with aerial transportation. The second flight from London to Egypt and to India has ended successfully. An air line is in operation between London and Paris. According to the despatches in order to remedy the slowness of correspondence with Alsace-Lorraine, the French Aeronautic Department has organized an air mail service between Paris and the principal towns of Alsace-Lorraine.

A regular aerial passenger service between London and Paris for the benefit of British members of the Peace Conference was opened on January 20. Several aeroplanes were fitted up for this purpose. They have a comfortable cabin for two passengers, including cushioned seats and a table, the whole inclosed with glass.

Major-General Sir W. Brancker, who recently visited America on a British mission, is taking an important post in connection with the Aircraft Manufacturing Company, of which Holt Thomas is managing director.

Announcement has been made already that this company is arranging an aerial passenger service between London and Paris. Plans will be developed in many other directions, including airlines from London to Glasgow, Edinburgh, Manchester, Newcastle, Wales and Ireland; also external lines from London to Sweden, Denmark, Holland, Spain and Italy.

Brancker will direct this scheme of aerial transport and also the higher aspects of international flying, the creation and development of an organization of pilots and aeroplanes. He will plan also the air routes over land, with landing grounds every ten miles, including a route from England to India, and at sea will look after the placing of a series of mark boats at intervals of 200 miles.

An American-British transatlantic air commerce line is one of the ultimate features which he will control, while still retaining the rank of Major-General in the Royal Air Service. Obtaining his services is regarded as a great triumph for the company.

THE AIRMEN IN CIVIL LIFE

There has been no small amount of speculation as to whether the men whom war placed in dangerous and spectacular work would be willing to return to the comparatively quiet and humdrum pursuits of peace. Inasmuch as the aviators were the men to whom opportunity for individual adventure and daring was afforded more than to any other class, the wonderment was most keen as to the occupations which they would select upon their return to civil life.

According to a statement of the Aero Club of America, the airmen do not wish to take up their careers where the call to war broke them off. They have sensed the thrills of the upper air; the conquest of a new element has fascinated them. The aerial mail service affords them an opportunity to continue their work in aviation; but many of them appear to find this tame and uninteresting. The commercial development of aviation offers another field. A London-to-Paris passenger and freight service is already in prospect; one from New York to Philadelphia is planned for the early summer. These offer fields for the development of speed and carrying capacity in planes; but they do not provide—and, indeed, it is doubtful whether anything can do this—a substitute for the thrills of meeting enemy planes in aerial combat.

Perhaps the particular calling which will offer the greatest attraction to the more adventurous aviators is the development of new types of planes. The early years of this century brought the automobile racer into prominence. One disadvantage of the holding of an aerial sweepstakes would be that it would be rather farcical to attempt to charge admission to spectators; but there would no doubt be enough prize money offered to make the winning of such events well worth while. Then there are the trans-Atlantic and trans-Continental flights yet to be achieved, and there might be a market for the "gentleman's speedster" type of plane. It may be that there will yet be thrills enough, even in a world at peace, to satisfy the most insatiable aeronaut.—*Editorial in Baltimore News.*

COLONEL DEEDS NOT TO BE COURT-MARTIALED

THE following correspondence is published by the War Department:

January 16, 1919.

Chairman, Committee on Military Affairs,
House of Representatives.

My Dear Sir:

Upon the submission to the President of the report of Honorable Charles E. Hughes, and the report of the Attorney General covering the Aircraft investigation. I directed that *the specific recommendations* contained in these reports *be extracted* for my consideration and for such action by me as might be required in the premises. These *extracts* were referred to the Judge Advocate General of the Army directing a thorough and comprehensive inquiry into the allegations affecting the conduct of Colonel Deeds. He was directed, not only to review all evidence taken by Judge Hughes, which the Attorney General kindly made available, but to secure all other facts obtainable in this case.

The Judge Advocate General committed the matter to a board of review consisting of officers of high ability and character wholly disassociated from any previous business or personal relations either with Colonel Deeds or with any matters affecting aircraft production. This board carefully and systematically examined all of this evidence and obtained all possible additional facts and its conclusions are, therefore, based upon fuller inquiry than was found possible within the time and opportunities at the disposal of Judge Hughes, and this examination is in effect the accomplishment of the thorough inquiry which Judge Hughes had in mind when he suggested that these transactions be examined by a Court-Martial. The purpose of Judge Hughes' suggestion is therefore accomplished.

This record undoubtedly shows that Colonel Deeds, absorbed in the activities of Aircraft Production, neglected to give his personal attention to transactions affecting his personal financial affairs, and this neglect on his part gave rise to appearances which required painstaking investigation in order to show their true character.

The unanimous report of this board of review, approved by the Acting Judge Advocate General, recommends that Colonel Deeds be not tried by Court-Martial on any of the grounds suggested, and this recommendation has been approved by me.

Colonel Deeds was one of a large group of men who came to Washington at great personal and pecuniary sacrifice to render service to the Government in the great emergency caused by our participation in the war.

My duty as Secretary of War with regard to any public servant under my jurisdiction is clearly to bring about proper punishment for wrongdoing and equally clearly to protect those public servants whose conduct is faithful and upright against embarrassment, humiliation or loss.

Very wide publicity has been attached to the acts of Colonel Deeds as a member of the Aircraft board. Whether it will ever be possible to overtake the judgments which have been formed upon partial information on this subject, I do not know; but this department will make every effort to secure the widest publicity for the action now taken and for the grounds upon which it rests. To carry this into effect, I am therefore transmitting to your Committee for its information, and with the request for its publication in the Record, if the proprieties of the situation permit, a copy of the report of the Judge Advocate General. Similar copies are being furnished the Chairman, Committee on Military Affairs, United States Senate, the Attorney General and Colonel Deeds.

Inasmuch as the purpose of Judge Hughes' suggestion has been accomplished, I have directed that all the records in this case be filed in the War Department and that this matter be considered as closed.

Cordially yours,
NEWTON D. BAKER,
Secretary of War.

December 26, 1918.

MEMORANDUM FROM THE CHIEF OF STAFF:

SUBJECT: Proposed court-martial proceedings in the case of Colonel Edward A. Deeds, Signal Corps.

REVIEWED by THE BOARD OF REVIEW—READ, (Chief of Division) MILLAR, TUCKER and KEEDY, judge advocates.

1. Pursuant to the reference to this office of the report of Judge Hughes of the Aircraft Inquiry for review and recommendation (1) as to what disciplinary action, if any, should be taken with reference to the persons affected, and (2), as a subsidiary matter, for a statement from this office as to the desirability of granting requests of certain officers therein mentioned, for courts of inquiry, independently of any action which might be recommended as to disciplinary measures to be taken, this office submitted under date of November 11, 1918, a memorandum on the subject, *based solely upon the report of Judge Hughes* hereinabove referred to, and containing certain recommendations, among which was a recommendation that Colonel E. A. Deeds be tried by court-martial upon charges based upon certain facts set forth in said memorandum.

2. The memorandum from this office hereinabove referred to has since been returned with instructions to examine the question with regard to the case of Colonel Edward A. Deeds "with reference to all the facts obtainable," and to base the advice of this office on inspection of the evidence taken by Judge Hughes and all other facts obtainable with the suggestion that this office send for Colonel Deeds, his former counsel, Judge McCann, of Dayton, Ohio, Mr. W. W. Montgomery, counsel for the Aircraft Board, and any other persons who might aid in the inquiry.

3. Pursuant to these instructions Colonel Deeds, Judge McCann, and others who were in a position to lay before this office facts in addition to those referred to in the Hughes report, were sent for and interviewed. At the request of this office sworn statements have been submitted by Colonel Deeds, Judge McCann, H. E. Talbott and George B. Smith (Col. Deeds' confidential agent), and an unsworn statement by Major E. A. Coleman, Disbursing Officer, Bureau of Aircraft Production. In addition consideration has been given to letters from Hon. John D. Ryan, Director of Air Service, referred to this office by the Secretary of War, and to a letter from Mr. Montgomery, submitted by Mr. Ryan, all of which statements and letters are forwarded herewith. After reading these documents and the testimony relating to Colonel Deeds given at the inquiry made by Judge Hughes, and after careful consideration of the subject referred to it, this office submits the following memorandum:

INTRODUCTORY

4. In order to understand the true bearing of the transactions criticized by Judge Hughes in his report upon the relations between Colonel Deeds and the Government, it will be necessary to mention briefly the business associations of Colonel Deeds at the time the call came to him to serve the Government, together with events immediately preceding his being commissioned an officer in the United States Army.

In the early part of 1917, Mr. Deeds was a man of wealth, well-known in the field of aircraft development. He was a large holder of stock in the Dayton Metal Products Company, which had profitable fuse contracts with the British Government and other contracts with the United States Navy Department, and which had accumulated a considerable surplus in its treasury. Mr. Deeds was vice-president of the company, receiving as such a salary of $25,000 a year. He had also been a large stockholder in what was known as the Delco Company, the stock in which, owned by him and his associates, had been sold to the United Motors Company for several millions of dollars in cash and, in addition, stock in the company. He was president of the latter corporation, drawing as such a salary of $60,000 per year. He was also largely financially interested in the Domestic Building Company, which owned the land and erected the building in Dayton, Ohio, subsequently acquired by the Dayton Wright Airplane Company for its principal aeroplane plant. On April 9, 1917, the Dayton Wright Airplane Company was incorporated, taking over the Orville Wright Airplane Corporation, in which Deeds had also been financially interested before that time. Deeds was an incorporator of the Dayton Wright Airplane Company, in which he had intended to become a stockholder and of which he intended to become vice-president, until his plans were changed because of his subsequent connection with the Government, as will be hereinafter recited. In all these enterprises he had been very closely associated with Charles F. Kettering, H. E. Talbott, senior, and H. E. Talbott, junior. Relations between these four gentlemen appear to have been unusually close and friendly.

On March 6, 1917, Mr. Deeds was requested by the Secretary of War to serve on a commission to be known as the Munitions Standards Board, which was constituted to be an "advisory channel through which may be made available to the various departments of our military establishment the civilian expert technical and commercial knowledge in matters relating to the procurement of munitions and supplies."

The Secretary of War in the letter of appointment, informed Mr. Deeds that he was asking him to undertake this patriotic service for the country, although there was no authority of law for compensating him in any financial way for personal services. This appointment Mr. Deeds at once accepted. A family bereavement prevented him from performing any duty on the Board.

On April 4, Mr. Deeds reecived a telegram from Mr. Howard Coffin, of the Council of National Defense, requesting him to come to Washington at once, and to bring with him Kettering and Talbott. These three gentlemen came to Washington, and Mr. Coffin stated in a somewhat indefinite way that the Government needed men of experience to help work out the aeroplane problems in Washington. In response to Mr. Coffin's request that Messrs. Talbott and Deeds make an industrial survey of the United States with a view to apportioning the raw materials between war necessities and business in anticipation of shortages of raw materials, these two gentlemen spent a few days in consideration of the subject, but the project proved impractical and they returned to Dayton. Mr. Coffin afterwards communicated with Deeds with reference to his becoming a member of a committee to aid in the aviation project, in response to which Mr. Deeds sent the following telegram:

Washington, D. C.
May 10, 1917.

Howard E. Coffin,

Darien, Georgia.

Appreciate very much your confidence in suggesting me on aviation commitee. Two things are troubling me. First, we will sell bonds and let contracts on conservancy this summer, which will require one-half my time after June fifteenth and this must take precedence. Twenty-five millions are to be spent. Second, my activity as Vice-President of the Dayton Wright Airplane Company might bring criticism. You may not know that our Dayton crowd got behind Orville Wright long before war was declared. Our first factory building one hundred by five hundred will be occupied in about six weeks. Our motive is to do some constructive work in aviation and our whole development force is being directed toward that end. We will undoubtedly build machines for the Government and the public might not understand. For these reasons I doubt the wisdom of my accepting. Whether I sit on the board or not, you may give me any specific job such as locating and building a supply station, equipping a field, or anything else, and I will come across as best I can. Would like your advice before giving final decision.

E. A. Deeds."

(*Continued on page* 996)

THE NEWS OF THE WEEK

Aeronautic Exposition Plans Progressing

As the result of a conference held January 15 at the offices of the Manufacturers Aircraft Association, it is assured that the Aeronautical Exposition of the Association is to be one of the most remarkable affairs ever presented in the history of the United States.

When the Manufacturers Aircraft Association decided that aeronautics had a commercial future and therefore that the exposition was justified, it presented the proposition to the War and Navy Departments, with a request for cooperation and advice. The aeronautical industry from the time we entered the war against Germany has been closely bound up with the Government, and therefore it was natural for the association to turn to the two great Departments for counsel. The response was extraordinarily gratifying. The officials became personally interested in the idea of holding in New York City an exposition of national character. Heads of the various bureaus undertook to collect a possible list of exhibits, and on January 15 at the conference in this city these lists were presented for mutual consideration.

Commander G. C. Westervelt and Lieutenant Commander A. C. Read, represented the Navy. Major H. M. Clark, Major Henry J. Miller, Captain L. E. Rubel, Captain J. S. Maholl, Captain Roy Francis and Lieutenant John Tuerk represented the Army.

It is impossible at the present time to make public the lists as submitted by the Navy and Army representatives, but it may be stated with authority that never in the history of the United States have the Departments been able to gather together such a remarkable collection, judged from military, naval, scientific and commercial standpoints as that which will be available for the manufacturers' exposition.

The Navy has suggested for exhibition more than half a dozen aeroplanes and flying boats, one of which is the famous "NC1," which not long ago at Far Rockaway carried fifty passengers in a flight of considerable length.

The Army has in mind for the exposition twenty-five aeroplanes, some ten or more of which are foreign types. These include war trophies, among which are the latest examples of German aerial manufacture. Included in the proposed Army exhibit are a Handley Page and a Caproni. This is interesting inasmuch as it will enable the Manufacturers Aircraft Association to present to America for the first time at one place the greatest examples of aeroplane construction in the United States, Great Britain and Italy. In addition a representative group of airships, it is expected, will be included from France and Germany.

While, of course, it will not be stated absolutely that all of these planes will be placed on view, it is known that the committees representing the Army, Navy and Manufacturers Aircraft Association are working along these lines, and therefore announcements may be expected shortly.

It was evident from the lists as submitted by the Army and Navy that these Departments regarded the manufacturers' exposition as an extraordinary opportunity to present to the public the achievements of America in the air.

The lists of proposed planes, instruments and trophies reveal items around which heretofore secrecy was maintained due to military necessity. But now that the power of Germany is broken and the war virtually at an end, the Departments feel at liberty to take the world into their confidence and tell exactly how much America accomplished during the eighteen months we were in the conflict. Both Departments have proposed to stage demonstrations inside and outside of Madison Square Garden, and it is thus assured that the exposition will assume a semi-official character. It is evident from this that the Garden will be too small to house all the exhibits available from the Government and the various manufacturers, therefore it may be regarded as probable that the Manufacturers Aircraft Association will hold simultaneous shows in other available places. In this connection one or more of the armories have been mentioned, and negotiations are under way to obtain them for the period.

Macauley Plans New Flights

Fort Worth, Tex., January 18.—Major T. C. Macauley, commanding officer at Taliaferro Field, will soon attempt to fly from Fort Worth to San Diego and return in forty-eight hours and another to Jacksonville, Florida, and return. Major Macauley has made a round trip to the Pacific Coast in four days.

New Air Chief Receives D. S. M.

Upon recommendation of General Pershing, the Distinguished Service Medal has been awarded to Major General Charles T. Menoher, U. S. Army, for exceptionally meritorious and distinguished service. He was in command of the 42nd Division from Chateau-Thierry to the conclusion of the Argonne-Meuse offensive, including the Baccarat Sector, Rheims, Vesles and St. Mihiel Salient, with his division, he participated in all of these important engagements.

In awarding the medal, it is mentioned that the reputation as a fighting unit of the 42nd Division was in no small measure due to the soldierly qualities and the military leadership of General Menoher.

Capt. J. Norman Hall Set Free

Washington, January 19.—Captain James Norman Hall, according to information from the War Department, has been released together with 135 other war prisoners. Captain Hall was driven down behind the German lines last May, as a member of the Lafayette Escadrille.

Automobile Association to Hold Banquet for Capt. Rickenhacker

Captain Edward V. Rickenbacker, erstwhile champion automobile race driver, and, by virtue of his official record of bringing down twenty-six "Hun" fliers, America's leading "Ace," is to be the guest of honor at a banquet arranged by the Contest Board of the American Automobile Association, on behalf of the automotive sport and industry of the United States, which will be held in the ballroom of the Waldorf-Astoria February 3.

Vedrines Lands On Roof

Paris, January 19.—Jules Vedrines, the French aviator, landed in a plane on the roof of the Galleries Fafayette. The feat is notable, for the roof is fenced about by sky signs and other erections, its dimensions being approximately 46 feet in width and in length about 82 feet. The width of the aeroplane used by Vedrines is 39 feet.

For being the first airman to accomplish the feat of landing on a roof Vedrines is the winner of a $5,000 prize.

Air Service Histories

Special efforts are being made to secure the histories of every aero squadron that has been in the American Expeditionary Forces for use in the history of the Air Service. Lieut H. W. Heintz, A.S., has been detailed to the Aeronautical Information Branch of the Executive Section, D. M. A., to carry out this work in the United States. The original copies of the squadron histories will be kept in the Aeronautical Information Branch at Washington, carbon copies being forwarded to the Information Section, Air Service, A. E. F.

May Prohibit Hunting By Air

St. Paul, Minn.—Minnesota's game laws may have to be amended to protect its ducks and geese from a new menace. State game wardens are considering the suggestion that the Legislature be asked to pass a bill tihs winter making it illegal to hunt feathered fowl from aeroplane.

Minnesota has turned out a great many aviators. It is understood that many aviators who observed the flight of ducks late this autumn decided that the modern hunter will travel in the air "bus."

From casual discussion the possibility of such hunting has caused statewide attention. Game wardens believe that ducks and geese could be slaughtered by aviators. Therefore, there is a possibility that the State Legislature will forestall such hunting.

Navigation Maps for Airmen

Washington.—Aerial navigation maps are included, under War Department orders, in the permanent military maps to be prepared and kept up to date in the records of the Department.

The purpose is to furnish military aviators with accurate route guides in flying from one place to another.

Areas to be mapped out will consist of zones twenty miles wide and connecting such cities and training centers as may be designated by the chief of staff.

Columbia to Honor Aces

Columbia plans special honors for two of its athletes who were named in the official list of American aces published in AERIAL AGE last week. Lieutenant Francis M. Symonds, of 20 West Eighth Street, and Lieutenant G. De Freest Larner are the two aviators Columbia contributed to the ranks of the Yankee aces. Symonds, according to the list, brought down five German planes, while Larner received credit for bringing eight to earth.

Lieutenant Symonds was captain of the Columbia 'Varsity football eleven of 1915, the team which went through the season without a defeat. He was a member of the class of 1916, and rowed in the freshman eight at Poughkeepsie in 1913. He was noted for his punting.

Lieutenant Larner was in the class of 1920, and was a freshman when the war broke out. He had won a place in the outfield of the 'Varsity baseball team.

Monument to Aviators

Officers of the Division of Military Aeronautics will cooperate with the Interior Department in erecting a memorial to aviators killed in the War.

The following named officers are constituted a Board to meet at the call of the President for the purpose of assisting and cooperating with the Secretary of the Interior and Mr. George B. Dorr in the matter of the erection of a monument in the Sieur de Monts National Park to the aviators who have died during the war: Major General W. L. Kenly, A. S. A.; Colonel F. R. Kenney, A. S. A.; Colonel Arthur Woods, A. S. A., and Captain Grover O'Neill, A. S. A.

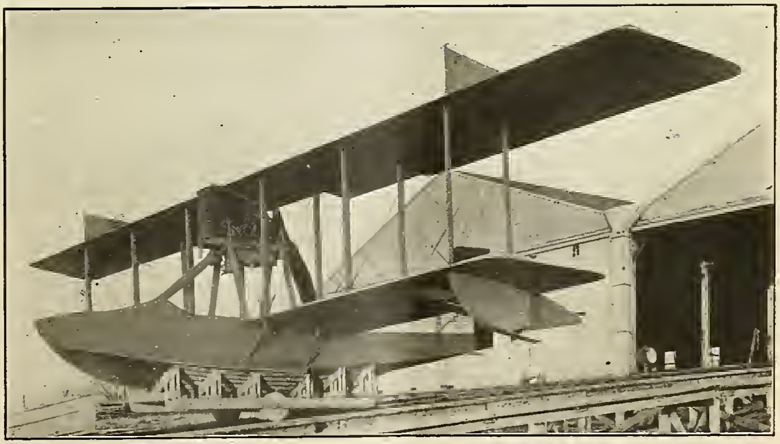
Aero Units En Route

Following organizations have been assigned to early convoy: 17th Aero Squadron, 4 officers, 154 men; 148th Aero Squadron, 4 officers, 154 men; 657th Aero Squadron, 2 officers, 149 men; 636th Aero Squadron, 3 officers, 147 men; 474th Aero Squadron, 7 officers, 460 men; 12th Balloon Company, 6 officers, 174 men; 102d Balloon Company, 8 officers, 170 men.

R. M. A.'s

The following named officers have been rated as Reserve Military Aviators, the date set after their respective names:

Major Charles Herrick Hammond, A. S. A.,



The Curtiss Model MF flying boat with a Curtiss OX5 engine at Port Washington, L. I.

January 8, 1919; Captain L. E. McQuitty, A. S. A., January 6, 1919; Captain Raymond Wilcox Smith, A. S. A., January 8, 1919; Captain Brady Walter Warner, A. S. A., January 8, 1919; 1st Lieut Paul Royal Corner, A. S. A., January 8, 1919; 1st Lieut. Harry Walker Colmery, A. S. A, January 8, 1919; 1st Lieut. Forrest Smith Emery, A. S. A., January 8, 1919; 1st Lieut. Joseph S. Pliska, A. S. A., January 8, 1919; 1st Lieut. Eben Stanley, A. S. A, January 8, 1919; 1st Lieut. Albert Hector Torongo, A S. A., January 8, 1919; 1st Lieut. A. W. Vanaman, A. S. A., January 6, 1919; 2nd Lieut. Clyde M. Allen, A. S A., January 7, 1919; 2nd Lieut. Charles Clark Bowen, A S. A., January 8, 1919; 2nd Lieut. Otto F. Burney, A. S. A., January 6, 1919; 2nd Lieut. John S. Childs, A. S. A., January 9, 1919; 2nd Lieut. C. F. Cocke, A. S. A., January 8, 1919; 2nd Lieut. Elmer Fred Degon, A. S. A., January 8, 1919; 2nd Lieut. Wallis A. Frederick, A. S. (M A.), January 6, 1919; 2nd Lieut. Taylor Nathan House, A. S. A., January 8, 1919; 2nd Lieut. John Prescott Hoyt, A. S. A., January 8, 1919; 2nd Lieut. Ellis A. Noland, Jr., A. S. (M. A.), January 9, 1919; 2nd Lieut. Mark H. Redman, A S. A., January 6, 1919; 2nd Lieut. Watkins Wendell Reynolds, A. S. A., January 8, 1919; 2nd Lieut. Frederick H. Winston, A. S. (M. A.), January 6, 1919; Captain R. S. Porter, A. S. A., December 3, 1918; Captain R. H. Torrey, A. S. A., December 3, 1918; Captain Frank F. Dell, A. S. A., January 10, 1919; 1st Lieut. Harmar D. Denny, Jr., A. S. A., January 10, 1919; 2nd Lieut. John C Bennett, A. S. A., January 10, 1919; 2nd Lieut. J. F. Dworschak, A. S. A., January 10, 1919; 2nd Lieut. H. A. Gulley, A. S. A., January 11, 1919; 2nd Lieut. George K. Rice, A. S. A., January 10, 1919.

Plans for Air Service

The suggested bill presented by Secretary Baker to Congress for the American Army on January 16th, included 1,923 officers and 21,853 men for the Air Service, specified as follows:

1	Major General	2,282	Sergts. 1st class
1	Brigadier General	1,737	Sergeants
22	Colonels	134	Mess Sergts.
45	Lieut. Colonels	2,485	Corporals
126	Majors	134	Buglers 1st class
438	Captains	2,738	Wagoners
696	First Lieuts.	584	Cooks
594	Second Lieuts.	4,366	Pvts. 1st class
1,923	officers	134	Buglers
515	Master Signal Electricians	6,744	Privates
		21,853	Enlisted Men

The Secretary of War reported to the Press January 16, 1919, as follows:

The Bill presented to the House Committee on Military Affairs today is the result of the study made by the General Staff for the creation of an army of five hundred thousand men, divided into such organizations and arms as have been shown by our experience in this war to be appropriate. Under the law as it now is, the present army is in process of demobilization. Some provision is therefore necessary to authorize a regular army for the transition period and until the situation growing out of this war is sufficiently clarified to enable the United States to determine the permanent military policy which will have a proper relation to its needs and obligations. No effort is made in tihs bill to treat the question of universal training or service, but merely to produce an army deemed adequate to meet obligations and needs which can now be foreseen.

In addition to this, the bill provides for the legalization of the present relations and organization in the General Staff in order to preserve what we have built up as the result of experience and growth. The present organization of the War Department is of course a wide departure from the organization which existed before we went into the war, and it is wiser to keep what we have than to go back to the beginning and start over at some future time. It is a part of the purpose of this bill to enable the government to officer the newly constituted regular army by retaining in the service officers of proved ability who have come in either from the national guard or from civil life during the war and who desire to make the army a permanent career The principle of promotion by selection rather than by strict seniority is introduced above the grade of captain. During the war of course promotion has been by selection, and our experience shows it to be both a wise and a just method of promotion.

Officers Honorably Discharged

The following officers of the D. M. A. have been honorably discharged from the service of the Government.

Ralph C. Cook, Second Lieutenant, A. S. A.; Edward A Robinson, Captain, A. S. A.; Hartwell L. Hall, Second Lieutenant, A. S. A.; Robert L. Warfield, Second Lieutenant, A. S. A.; James M. Magee, Captain, A. S. A.; Edward A. Stinson, First Lieutenant, A. S. A.; William J. R. Taylor, First Lieutenant, A. S. A.; Ward Bowers Fletcher, Second Lieutenant, A. S. (M. A.); Roy P. Crany, First Lieutenant, A. S. A.; James A. Higgs, Jr., First Lieutenant, A. S. A.; Duncan Langdon, First Lieutenant, F. A.; Roger Tuckerman, Second Lieutenant, A. S. A.; Henry A. McAleenan, Second Lieutenant, A. S. A.; Roy L. Helstrom, Second Lieutenant, A. S. A.; Lawrence G. Ganniny, Second Lieutenant, A. S. A.; Wm. R. Gregory, Second Lieutenant, A. S. A.; Edward R. Spiegel, Captain, A. S. A.; E. Hubert Litchfield, Major, A. S. A.; Charles F. Mills, Second Lieutenant, A. S. S. C.; Pendleton Howard, Second Lieutenant, A. S. A.; Michael A. Kiely, First Lieutenant, A. S. A.; Harry H. Singletary, Second Lieutenant, A. S. A.; Ralph Earle, First Lieutenant, A. S. A.; Edwin C. Smith; Second Lieutenant, A. S. A.; Theodore Sizer, First Lieutenant, A. S. A.; Nathaniel P. Davis, Second Lieutenant, A. S. A ; William G. Boggs, Second Lieutenant, A. S. A.; Philip E. Chase, Second Lieutenant, A. S. A.; William Bernard, First Lieutenant, A. S. A.; Edwin M. Eustis, Second Lieutenant, A. S. S. C ; Robert W. Pringle, Second Lieutenant, A. S. (M. A.); George H. Hannun, First Lieutenant, A. S. A.; Horace L. Stevenson, First Lieutenant, A. S. A.; Harry A. Irwin, Second Lieutenant, A. S. A.; David G. Logg, First Lieutenant, A. S. (M. A.); Lewis H. Mahony, Second Lieutenant, A. S. A.; Royal W. King, Captain, A. S. A.; Ray C. Bridgman, Captain, A. S. A.; Hyland P. Stewart, Second Lieutenant, A. S. A.; George D. Riedel, Second Lieutenant, A. S. A.; James M. Mason, First Lieutenant, Inf.; Anton Pieron, Second Lieutenant, A. S. S. C.

Phones from Air to General Kenly's Desk

A conversation was held Thursday morning, January 16, between Major General W. L. Kenly, Director of Military Aeronautics, seated before the ordinary desk telephone in his office, and Lieutenant Lucas of the Air Service, piloting a radio-equipped aeroplane. This communication involved the use of the telephone lines of the Chesapeake and Potomac system in combination with aeroplane radio. The connection between the line and wireless systems was made at the local radio station at Bolling Field, where apparatus was connected in such manner that speech originating in either system would be automatically transmitted over the other.

General Kenly, Colonel F. R. Kenney and Colonel C. C. Culver were among the Air Service Officers present in the office of the Director, and each talked with Lieutenant Lucas, who was piloting an aeroplane from Bolling Field. General Kenly's office 'phone was used and connected through in the ordinary manner with the branch line running to the radio hut at Bolling Field. At this point the conversation was automatically transferred to the radio system, by means of which it reached Lieutenant Lucas, the connection between the two systems being effected by means of apparatus and circuits designed and installed by members of the radio branch of the Air Service, under the supervision of Colonel Culver.

The aeroplane radio telephone has been in use for something over a year, and air fleets are being commanded by the voice of their commanders at several flying fields over the country. During the last summer communications have been made at some of the fields, in which conversation from the pilot in the air has been automatically transferred to land lines on the field with success, and conversation starting over land lines has been automatically transferred to radio, and by this means reaching the pilot in the air. The conversation yesterday morning, however, was the first official demonstration of a two-way conversation direct between a person using a line telephone and an aviator in flight.

Service Grant Suggested

Senator Vardaman on January 17th introduced a bill granting a bonus of $216 to all officers and enlisted men who served abroad and $180 to all who served in the United States.

Caproni Flies from Detroit to Dayton

Detroit.—A big Caproni bombing aeroplane, one of three built in Detroit, flew from Detroit to Dayton, Ohio. It was piloted by Capt. Edward L. Williams, Jr., chief instructor at the aviation field at Mineola, N. Y., and carried four passengers.

The plane, which has a wing spread of seventy-five feet, is equipped with four Liberty motors, capable of developing 1,050 horse-power.

In addition to the pilot those in the machine were Capt. U. V. D'Annunzio, son of Major Gabrielle D'Annunzio, Italian poet and avitor; Lieut. A. G. Lodewyck, Lieut. H. L. Harris and George Buzane, an automobile race driver, who is acting as guide on the trip.

Naval Officers detailed to supervise work at the Curtiss Engineering Corporation, Garden City. From left to right:—Lieut. J. K. Roosevelt, Lieut. William J. Lee, Captain S. V. Parker, Commander H. C. Richardson, Lieut. S. S. Pierce, Lt. Comdr. H. Wesson, Ensign T. P. Wright, Machinist Danly, Ensign T. J. McCarthy, Ensign G. N. Gregory, Ensign H. B. Sanford

The AIRCRAFT TRADE REVIEW

Curtiss Offices Move to New York City

The Sales and Advertising Departments of the Curtiss Aeroplane and Motor Corporation have been moved from Buffalo to 52 Vanderbilt Avenue, New York City. At this location, representatives of the parent organization and subsidiary organizations will take care of duties formerly attended to in various cities, principally Buffalo. In fact, the new offices will be a general headquarters for all branches of the Curtiss Company, including the Curtiss Aeroplane & Motor Corporation, Curtiss Engineering Company, and the Curtiss Exhibition Company, which controls the flying schools.

Mr. J. P. Davies has been made General Sales Agent. Other officers of the Company who will be located here are C. W. Webster, E. H. Ballard, and F. Leon Faurote, Advertising Manager.

Prossen with Nilson-Miller

L. P. Prossen has resigned as Mechanical Superintendent of the Black & White Taxicab Company, New York City, and become associated with the Nilson-Miller Company, of Hoboken, N. J. Mr. Prossen has been elected Vice-President and will be in charge of the Gear Cutting, Piston and Piston Ring Departments.

Herring with Ferdinand & Co.

Lloyd C. Herring has joined L. W. Ferdinand & Company as sales manager. For more than thirteen years Mr. Herring was connected with the Boston Office of the General Electric Company and for the past ten years as assistant to the District Manager of the Apparatus Sales Department of that Company.

S. A. E. Anuual Meeting

Over 800 tickets have already been taken for the Victory Dinner of the Society of Automotive Engineers to be given at the Hotel Astor, New York, on February 6th. It is expected that the number of S. A. E. members in attendance together with their guests will amount to 2,000. This social gathering of the automotive engineers will, aside from S. A. E. Midnight Whirl Party atop the Century Theatre, mark the conclusion of the most promising annual meeting held by the man who developed the American motor car and motor truck and are responsible largely for the progress made in aeronautics, motor boats, farm tractors and semi-portable farm units.

Four technical sessions will be held on February 5th and 6th, the Standards Committee making its final recommendations to the Society for the curent half-year on February 4.

President Charles F. Kettering will tell of the results of his investigations of more efficient utilization of fuel. Dr. David White, chief geologist of the U. S. Geological Survey, will report on the unmined supply of petroleum in the United States. Dr. E. W. Dean, of the Bureau of Mines, will speak on the status of refinery practice with particular reference to cracking methods. Dr. J. E. Pogue will give an interpretation of the engine fuel problem. Dr. H. C. Dickinson, of the Bureau of Standards, will present a paper on the status of engine efficiency in the United States. An estimate of the extent and utility of Mexican crudes in the near future will be given by E. De Golyer.

The effect of aeronautic engineering practices on motor car design and construction will be discussed comprehensively by H. M. Crane, of the Simplex Motor Car Co,; Howard Marmon, of Nordyke & Marmon, and O. E. Hunt, of the Packard Motor Car Co. D. McCall White, of the Cadillac Motor Car Co., will talk on the high-efficiency automobile engine. Thermodynamic cycles of the future will be treated by Sidney A. Reeve.

A. Ludlow Clayden will open a discussion on the need for lighter and more efficient cars.

In connection with motor truck engineering, John G. Utz will give historical notes on military truck standardization, and Major A. B. Browne is scheduled tentatively to outline some lessons in truck design developed by the war.

Live topics involved in the design and use of tractors of the farm, industrial and military types, are to be taken up. Lieut.-Col. Herbert W. Alden will speak on the U. S. Army tanks. Lieut.-Col. William Guy Wall will analyze automotive ordnance apparatus. A paper by G. W. Watson on British tanks is expected from England. Edward R. Hewitt will present a paper on the principles of the wheeled farm tractor.

The most spectacular and in a way the most compelling session will be that on aerouautics. John W. Smith will describe the fixed radial cylinder type of aeronautic engine. J. G. Vincent, of the Packard Motor Car Co., and until recently chief of the Airplane Engineering Division, Bureau of Aircraft Production, will give an authoritative and complete statement regarding the Liberty engine. An entertaining and illuminating presentation on forest products for aircraft use will be made by Cylde H. Teesdale.

The Navy Department will co-operate very generously in the program, Commanders H. C. Richardson and F. G. Coburn speaking respectively on airplane and seaplane engineering and production. Starr Truscott will have dirigibles as a subject. It is hoped that Commander J. H. Towers will tell of the operation of naval aircraft.

George F. Crouch will speak on the automotive application of marine engines in the war.

Practical Aviation

Practical Aviation, by Major J. Andrew White, is a text book for intensive study by men preparing to become military aviators, containing all the knowledge of fundamentals required prior to actual flying and air combat.

Each subject is presented by illustration and described completely for the reader without turning the page.

A broad treatment of subjects never before contained in general aeronautic text books is included, comprising operating and care of aviation engines, reconnaissance, map reading, signaling and cooperation with military bodies, radio and its uses, machine gunnery and bombing from aeroplanes.

Following is table of contents: The Theory and Principles of Flight; Elements of Aeroplane Design; Flight Stability and Control; Materials, Stresses and Strains, Rigging the Aeroplane; Fundamentals of Motive Power; Pistons, Valves and Carburetors; Ignition, Cooling and Lubrication of Engines; Types of Motors, Operation and Care of Engines; Instruments and Equipment for Flight; First Flights, Turning and Landing; Night Flying, Cross-Country Flight, Map Reading; Aerobatics; Meteorology for the Airman; Aerial Gunnery, Combat and Air Tactics; Observation, Reconnaissance and Fire Spotting; Bombing.

Definitions of aviation terms with their French equivalents and *phonetic pronounciation.* The book is designed particularly for individual and class study, with an analysis of important factors preceding each chapter and a set of review questions following every division.

This book can be purchased at The Aeronautic Library, Inc., 299 Madison Avenue, N. Y. C., at the price of $1.75 postpaid.

View in the final assembly department of the Zenith Carburetor Company, showing one-half day's Liberty Engine carburetor production

Hon. Albert S. Burleson, Postmaster General
Hon. Otto Praeger, Second Assistant Postmaster General
J. B. Corridon, Superintendent, Division of Aerial Mail Service

Louis T. Bussler, Chief of Maintenance and Equipment
J. Clark Edgerton, Chief of Flying Operations
George L. Conner, Chief Clerk, Division of Aerial Mail Service

US
AERIAL MAIL

PILOTS

Ira O. Biffle
Dana C. DeHart
Edward V. Gardner
Lawton V. Smith
Leon D. Smith
Robert F. Shank
Irving Graeh

John A. Jordan, Superintendent, Western Division
Trent C. Fry, Manager, Belmont Park, L. I.
Charles I. Stanton, Manager, College Park, Md.
John M. Miller, Manager, Bustleton, Pa.
O. J. Sproul, Manager, Chicago, Ill.
C. E. McMillan, Manager, Cleveland, Ohio
August Carlson, Manager, Lehighton, Pa.
Harry F. Powers, Manager, Bellefonte, Pa.
William Lindley, Manager, Clarion, Pa.
J. P. Edwards, Manager, Bryan, Ohio
Charles N. Kight, Special Representative

RESERVE PILOTS

Lester F. Bishop
Dan Davison
C. C. Eversole
E. A. Johnson
D. I. Lamh
Frank McCusker
E. H. Lee
Lyman Doty

CHIEF MECHANICS

Frank Tower
Edward C. Radel
Chas. C. King
H. E. Fremming
Albert Cryder

Progress in Preparation for Air Mail Service Between New York and Chicago

The Post Office Department authorizes the following:

Important progress in preparation for the New York-Chicago air-mail service was announced recently by the Post Office Department. While Otto Praeger, Second Assistant Postmaster General, in charge of aerial projects, was unable to announce the exact date on which the Atlantic Seaboard-Great Lakes route will be in operation, he declared that thorough plans for the utilization of war material as far as possible and the modification of unsatisfactory equipment should be completed within a few weeks and that flights would be made on schedule.

"Very few persons realize what an undertaking this is," said Mr. Praeger. "Never has a trip by air been undertaken whereby a ship leaves for an 800-mile voyage, one each way a day, flying over mountains with very few landing places—an undertaking which six months ago would have been regarded absolutely impossible. When you consider that this is being done with a single-motored plane the task is stupendous. This has never been attempted, either in America nor in any other country of the world, and great credit is due to the organization undertaking it.

Military Planes Not Suitable

"Through the absence of the fullest degree of co-operation the New York-Chicago air mail service was deprived of essential support. Our experiments demonstrated that military construction, especially the type available last December, was neither safe nor economical for mail purposes, and the Post Office Department, with a full appreciation of the desirability of utilizing all material left over from the war, is endeavoring to work out a system whereby there can be developed a ship capable of carrying at least 250 pounds of mail and yet afford the pilot the maximum degree of safety.

"A military plane is designed for military purposes, not mail or commerce. Its weight distribution is faulty, when it comes to carrying letters, and the hope in the future is to have in the New York-Chicago service a machine provided with a distinct compartment. This will do away with the makeshift of using the gunner's cockpit. The reason we have had success in the service between New York and Washington is that training planes and not fighting ships have been available.

Want Low-Compression Motors

"When the New York-Chicago service is resumed we expect to have low-compression Liberty engines, rather than the high-compression military type. This is a point now being worked out. The high-compression motor is designed for altitude work; in carrying the mails we fly at a comparatively low height and so require a motor that functions efficiently at the proper level.

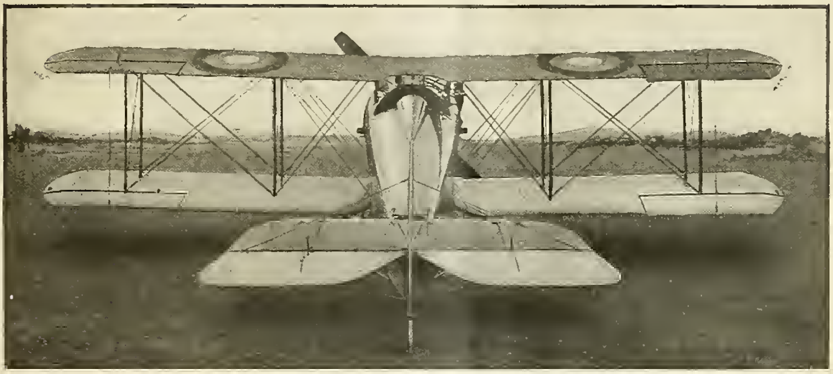
"The Post Office Department feels that it will be possible to use much of the military equipment, though the fuselage and landing gear of available army planes must be strengthened or altered to meet commercial conditions. This work is under way. With regard to motive power, which caused some trouble at the start of the New York-Chicago service, the Post Office Department has on its staff the most competent Liberty motor mechanics and, in addition, has the help of expert mechanics and riggers placed at our disposal by the aeroplane industry.

Five Landing Fields

"Further preparations also are being made along the New York-Chicago route. The department has established five landing fields and emergency stops for the 800-odd miles. Leaving Belmont Field, N. Y., the air-mail pilot will have an emergency haven at Lehighton, Pa., 105 miles distant. One hundred and fifteen miles farther he will have a regular stop at Bellefonte, Pa. Across the crest of the mountains, a stage of 87 miles, he will have a safety field at Clarion, Pa."

The Aerial Mail Carriers' View of Rio de Janeiro

THE STANDARD E-1 SINGLE SEATER



Rear view of the Standard Model E-1 Secondary Training Aeroplane

THE "E-1" Single Seater built by the Standard Aero Corporation was designed as a secondary training machine. It is provided with either an 80 H.P. Le Rhone or a 104 H.P. Gnome engine, but in either case the dimensions of the machine remain the same. Slight difference in weights and performances result, depending upon which engine is used, so separate lists are given herewith where such differences occur.

The R. A. F. No. 15 wing curve is used. Dihedral, 3%; aspect ratio of both planes, 7; stagger, 13.02". There is no sweepback nor decalage. Wings are set at an angle of 2° to the propeller axis.

When at rest on the ground the axis of proper is 5' 6" above ground, and when the machine is in flying position the axis is 5' 1" above ground.

Maximum diameter of fuselage, 42½"; fineness ratio, 5.

General Dimensions

	Feet
Span, upper plane	24
Span, lower plane	24
Chord, both planes	3.5
Gap between planes	4
Length over all	18.85
Height over all	9.08

Areas

	Square feet
Upper plane	81
Lower plane	72.3
Ailerons (2 upper and 2 lower)	23.2
Total wing area with ailerons	153.3
Stabilizer	12
Elevator	12.7
Fin	2.6
Rudder	6.8

Summation of Weights

(With Le Rhone Engine)

	Weight in pounds	Percentage of gross weight
Power plant	434	36.4
Fuel and oil	140	11.8
Pilot and miscellaneous equipment	179	15.1
Armament	28	2.4
Body structure	141	11.9
Tail surfaces with bracing	36	3.1
Wing structure	156	13.1
Chassis	74	6.2
Total	1,188	100.0

Summation of Weights

(With Gnome Engine)

	Weight in pounds	Percentage of gross weight
Power plant	467	36.6
Fuel and oil	196	15.4
Pilot and miscellaneous equipment	179	14.0
Armament	28	2.2
Body structure	141	11.1
Tail surface with bracing	36	2.8
Wing structure	156	12.2
Chassis	74	5.7
Total	1,277	100.0

Weight per h.p.	Le Rhone, 14.5
Weight per sq. ft.	Le Rhone, 7.6

Power Plant

	Gnome Pounds	Le Rhone Pounds
Engine complete with carburetor and ignition system	300	280
Pipes and braces	9	15
Fuel Tank, empty	28	21
Oil Tank, empty	11	11
Propeller	33	21
Propeller Hubs	7	7
Cowling	79	79
Total	467	434

Fuel and Oil

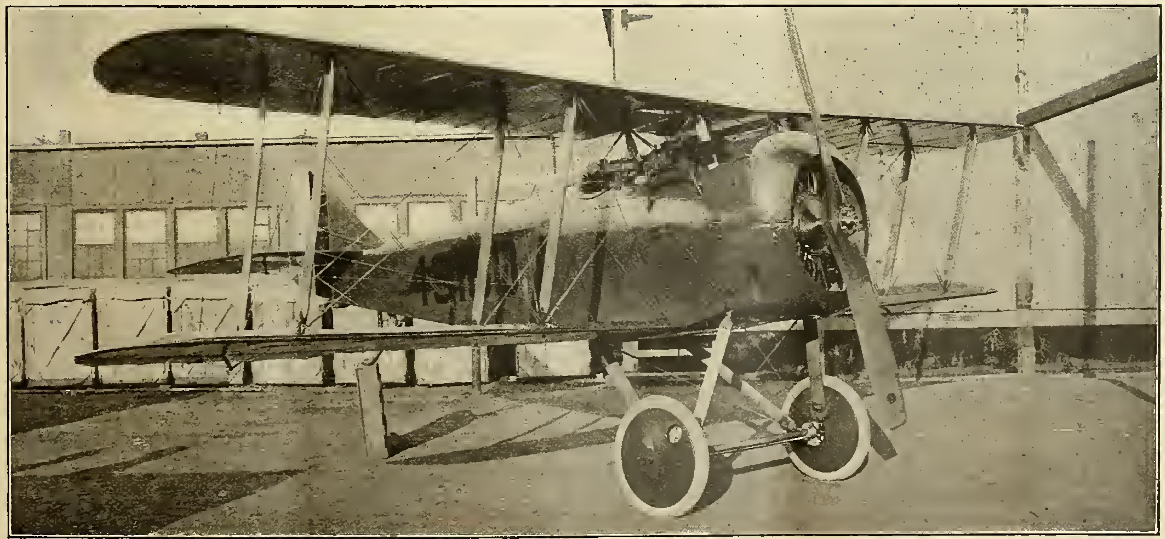
	Gnome Pounds	Le Rhone Pounds
Fuel	156 (27 gal.)	116 (20 gal.)
Oil	40 (25 gal.)	24 (3 gal.)
Total	196	140

Pilot and Equipment

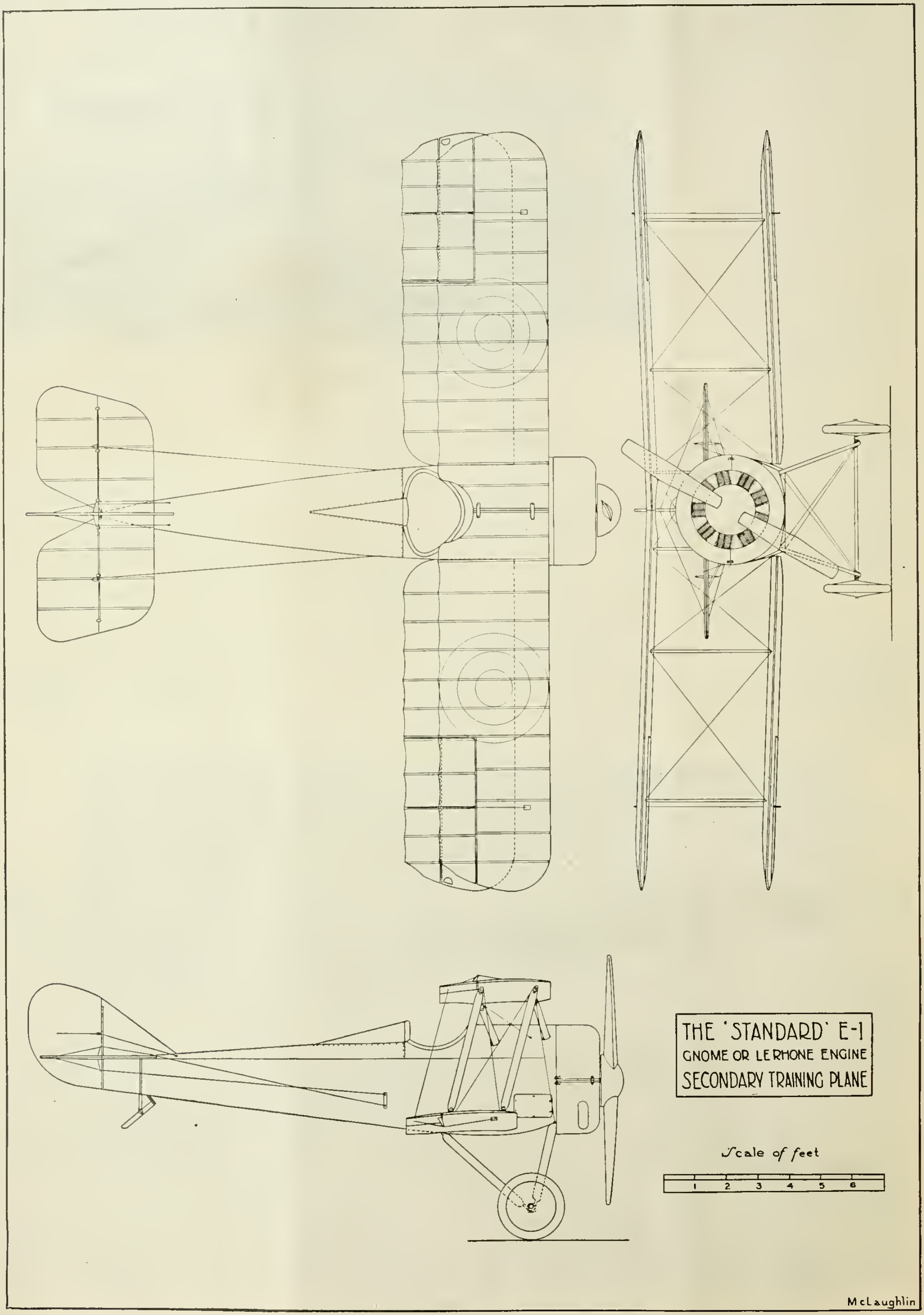
Pilot and clothing	170
Dashboard instruments*	6
Fire extinguisher	3
Total	179

*Compass, aneroid, tachometer, and oil gauges.

(*Continued on page* 987)



The Standard Model E-1 Single Seater equipped with an 80 H.P. Le Rhone engine



THE 'STANDARD' E-1
GNOME OR LE RHONE ENGINE
SECONDARY TRAINING PLANE

Armament

Gun Camera	19
Sights	4
Mount	5
Total	28

Body

Body Frame, Engine Bed, Seats, and Floor	118
Controls	23
Total	141

Tail Surfaces with Bracing

Stabilizer	11
Elevators	14
Fin	2
Rudder	5
Bracing and fittings	4
Total	36

Wing Structure

Upper Wing (with fittings and ailerons)	56
Lower Wing (with fittings and ailerons)	40
Interplane Struts	22
Interplane Cables	22
Total	140
Ailerons	14
Controls	2
Total	156

Chassis

Wheels complete	32
Axle	13
Shock Absorber	1
Miscellaneous parts	28
Total	74

Power Plant

(*Le Rhone*)

The Le Rhone is a nine-cylinder, air-cooled rotary engine developing 80 h.p. at 1,200 r.p.m. and 84 h.p. at 1,290. Bore and stroke, 4 1/16" by 5½".

The carburetor is especially designed for the Le Rhone. Ignition is supplied by a gear-driven, high-tension magneto.

Fuel tank located near center of gravity, has a capacity of 20 gallons. Fuel is consumed at the rate of .725 lbs. per h.p. per hour.

Oil tank, located below fuel tank, has a capacity of 3 gallons. Oil is consumed at the rate of .03 lbs. per h.p. per hour.

(*Gnome*)

The nine-cylinder rotary Gnome, manufactured by the General Vehicle Company, is known as type B-2. At 1,200 r.p.m. it delivers 104 h.p. Bore and stroke, 110 mm. by 150 mm.

Fuel tank has a capacity of 29.5 gallons; rate of consumption, .80 lbs. per h.p. per hour.

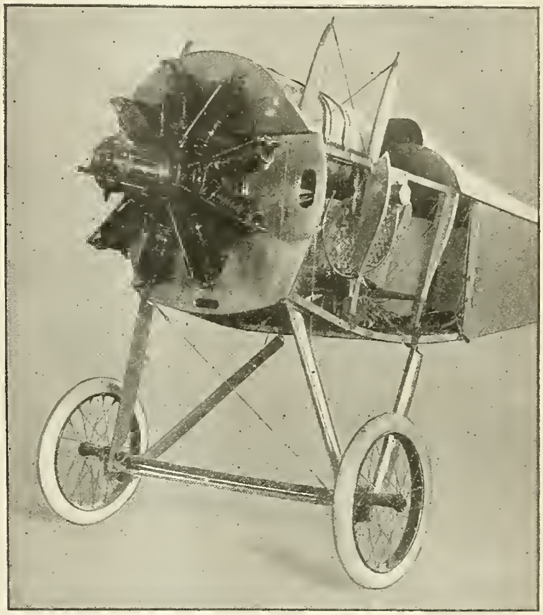
Oil tank capacity, 5 gallons; rate of consumption, .20 lbs. per h.p. per hour.

Summary of Performances

(*With Le Rhone Engine*)

Height (*Feet*)	Speed (*M.P.H.*)	Time of Climb	Rate of Climb *Ft. per min.*
Ground	100–103	0 min. 0 sec.	705
5,000	....	8 min. 0 sec.	705
5,500	95	....	...
8,500	90	16 min. 30 sec.	...
10,000	85	22 min. 20 sec.	200

Ceiling, 14,500 feet.
Stalling speed, 48 m.p.h.
Gliding angle, 1:7.
Maximum range: At 5,000 ft., 200 miles; 10,000 ft., 160 miles.



Detail of fuselage front, showing Gnome engine installation, Standard E-1 Single Seater

Cited for Distinguished Service

Maj. Harold E. Hartney, Air Service, 1st Pursuit Group. For extraordinary heroism in action near Fismes, France, August 13, 1918. Maj. Hartney voluntarily accompanied a reconnaissance patrol. Realizing the importance of the mission, Maj. Hartney took command, and, although five enemy planes repeatedly made attempts to drive them back, he continued into enemy territory, returning later to our lines with important information. The cool judgment and determination displayed by Maj. Hartney furnished an inspiration to all the members of his command. Home address, Mrs. Harold E. Hartney, care of Russell Hartney, Saskatoon, Saskatchewan, Canada.

Second Lieut. Richard Wilson Steele, observer, Air Service, 166th Aero Squadron. For extraordinary heroism in action near Bois D'Barricourt, France, October 23, 1918. While on a bombing raid back of the German lines Lieut. Steele, accompanied by his pilot, was attacked by six German pursuit planes. They were forced to leave the formation in which they were traveling owing to engine trouble; the enemy began riddling their plane with machine gun fire. Lieut. Steele fought them on all sides and is credited by members of the 11th Aero Squadron, who were flying over him several thousand feet, with having brought down one of his opponents. He was wounded twice in the leg and twice in the arm ond continued fighting, although each time he was hit he was knocked down into the observer's cockpit. At last, however, only his tail gun was in working condition, the other two having been disabled by bullets, and Lieut. Steele sank unconscious into the cockpit. Home address, William Steele, father, 426 East Euclid Avenue, Oak Park, Illinois.

First Lieut. Hugh L. Fontaine, Air Service, 49th Aero Squadron. The bronze oak leaf is awarded Lieut. Hugh L. Fontaine for extraordinary heroism in action near Champigneulle, France, October 10, 1918. While leading a patrol of three other machines Lieut. Fontaine attacked four enemy planes in the region of Champigneulle. He succeeded in shooting down two of the enemy planes in flames. The first of these he shot down in the initial attack. The second he attacked while it was endeavoring to shoot down one of our planes which had been rendered helpless by the loss of one of its wings. He dived on the attacking plane and shot it down in flames. Home address, Dr. Bryce Fontaine, stepfather, 1839 Overton Park Avenue, Memphis, Tenn.

First Lieut. Raymond P. Dillon, pilot, Air Service, 24th Aero Squadron. For extraordinary heroism in action near Mezieres, France, November 3, 1918. Lieut. Dillon exhibited courage in the course of a long and dangerous photographic and visual reconnaissance in the region of Mezieres with two other planes of the 24th Aero Squadron. Their formation was broken by the attack of ten enemy pursuit planes; five enemy planes attacked Lieut. Dillon and his observer, who succeeded in shooting down two of these out of control. They then had a clear passage to their own lines, but turned back into Germany to assist a friendly plane with several hostile aircraft attacking it. They succeeded in shooting down one more of the enemy. Home address, Claude A. Dillon, brother, 5839 Prairie Avenue, Chicago, Ill.

Second Lieut. John B. Lee, 3d, Air Service, observer, F. A. 24th Aero Squadron. For extraordinary heroism in action near Mezieres, France, November 3, 1918. Lieut. Lee exhibited extreme courage in the course of a long and dangerous photographic and visual reconnaissance in the region of Mezieres with two other planes of the 24th Aero Squadron. Their formation was broken by the attack of ten enemy pursuit planes; five enemy planes attacked Lieut. Lee and his pilot. With remarkable coolness Lieut. Lee succeeded in shooting down two of the planes. They then had a clear passage to their own lines, but turned back into Germany to assist a friendly plane with several hostile aircraft attacking it. They succeeded in shooting down one more of the enemy. Lieut. Lee and pilot returned to our lines with information and photographs of great military value. Home address, John B. Lee, jr., father, 667 Highland Avenue, Newark, N. J.

First Lieut. George A. Goldtbwaite, pilot, Air Service, 24th Aero Squadron. For extraordinary heroism in action near the Bois de Bantheville, France, October 15, 1918. In the course of a special reconnaissance to locate a hostile concentration massing for a counterattack in the vicinity of the Bois de Bantheville, Lieut. Goldthwaite and his observer flew generally at an altitude of 400 meters, at times as low as 50 meters, 5 kilometers into the enemy's lines. Antiaircraft guns riddled his plane with bullets, pierced the gasoline tank, and drenched both pilot and observer. He continued on until the

(*Continued on page* 995)

NOMOGRAPHIC CHARTS FOR THE AERIAL PROPELLER

By S. E. SLOCUM, Ph.D.

Professor of Applied Mechanics, University of Cincinnati, Member S. A. E.

IN discussing propeller performance it has been customary to assume that the power absorbed by the propeller varies as N^3D^5, and that the thrust varies as N^2D^4, where N denotes the propeller speed in revolutions per minute or per second, and D is its diameter. These assumptions, however, are only true for an ideal propeller; that is, one which is perfectly rigid and perfectly symmetrical. For a propeller as actually constructed, the law governing power and thrust may differ materially from the above theoretical assumptions. This fact has been shown by the writer in articles appearing in this magazine for August 26 and November 18, 1918. In these articles the actual laws governing propeller thrust and power for a particular propeller were developed directly from experimental data obtained by M. Eiffel and Captain Dorand, without making any theoretical assumptions whatever, the method employed being the standard process for the adjustment of observations by the method of Least Squares. The results showed that the performance of a given propeller may differ materially from that prescribed by theory for an ideal propeller, and also showed how experimental data on propellers may be analyzed on its own merits, independently of all dynamical assumptions.

As long as the whole subject of propeller performance was in the experimental stage, it was doubtless wise to base all calculations on the assumption of an ideal propeller, as it gave a certain uniformity to results. At present, however, when propeller types are becoming standardized, it certainly permits of greater refinement in design to determine by experiment the characteristics of the standard types of propeller adopted. This is the method followed in all lines of engineering. For instance, the performance of aviation motors is determined for a given type of motor by actual test of this type and not solely from the principles of thermodynamics, while as another example, the firing data for a long range gun are based on experiments made on this particular type of gun and not on the ideal assumptions of a perfect projectile fired in vacuo.

Of course it cannot be expected that general formulas for thrust and power can be derived which will apply universally to all types of propellers, any more than that a gas engine power formula can be derived which will apply accurately to all types of motors. It is perfectly possible, however, to derive formulas by the method mentioned above which will apply accurately to a *given type* of propeller, which will assist materially in the problem of powering aircraft, that is, in determining the most effective combination of motor and propeller for a given wing and fuselage assembly.

The formulas so obtained, however, are exponential, and consequently somewhat difficult to use in their algebraic form. To represent graphically the various combinations of quantities involved, M. Eiffel devised what he called "Polar Logarithmic Diagrams," which constitute, in fact, a very ingenious and practical application of vector algebra. But the application as well as the theory of these diagrams, is rather complicated, while the results depend in part at least on determining the intersection of lines which meet at an acute angle, and such points of intersection are liable to a considerable error when determined graphically.

There has recently come into use another means for the graphical solution of exponential formulas which is similar in principle to that devised by M. Eiffel in that it depends on the reduction of an exponential to a linear form by the use of logarithms, and the employment of logarithmic scales. This device consists in the construction of diagrams called nomographic charts, or alignment charts, from which the required results may be obtained by simply connecting the points representing the given data by straight lines, and then reading off the intercepts on the proper scale, the method being similar to that of using a slide rule.

In Plates I and II accompanying this article, nomographic charts are shown which represent the formulas for thrust and power of the aerial propeller as previously derived by the writer in the references given above. These charts, of course, are not universal, as they simply represent the performance of a particular propeller, but similar charts differing only very slightly from these may be constructed for any standard type of propeller, and their use will facilitate calculations on this propeller to the same extent that the use of the ordinary slide rule simplifies arithmetical calculations.

It may be noted that the effect of varying the exponents of N and D will be to move the intersection axes slightly to one side. For instance, if we follow the theoretical assumption that the thrust varies as N^2D^4, the intersection axis on the thrust chart will be moved slightly to the right of the position shown; while similarly on the power chart, the assumption of N^3D^5 will also move the intersection axis slightly to the right. Likewise any change in the quadratic terms involved in these formulas will affect the relative location of the points on the scale giving the ratio $\frac{V}{ND}$, and in this way change the readings on the horsepower and thrust scales. Except for such shifting of the intersection axes and changes in the graduation of the various scales, the nomographic charts will be exactly similar in form for all types of propellers.

Having determined the thrust and power for a given propeller, the torque and efficiency are easily found. Thus

$$\text{Torque} = \frac{\text{H. P.}}{2\pi N}$$

and

$$\text{Efficiency} = \frac{\text{Useful work}}{\text{Total work}} = \frac{F.V.}{550\,\text{H. P.}},$$

where F denotes the propeller thrust, and V is the speed of the plane, or relative velocity of the wind with respect to the propeller. To make the graphical solution complete, however, nomographic charts may also be constructed to give torque and efficiency, as shown on Plate III.

These charts are presented separately in Plates I, II and III for the sake of clearness, and an example of their use is shown on each.

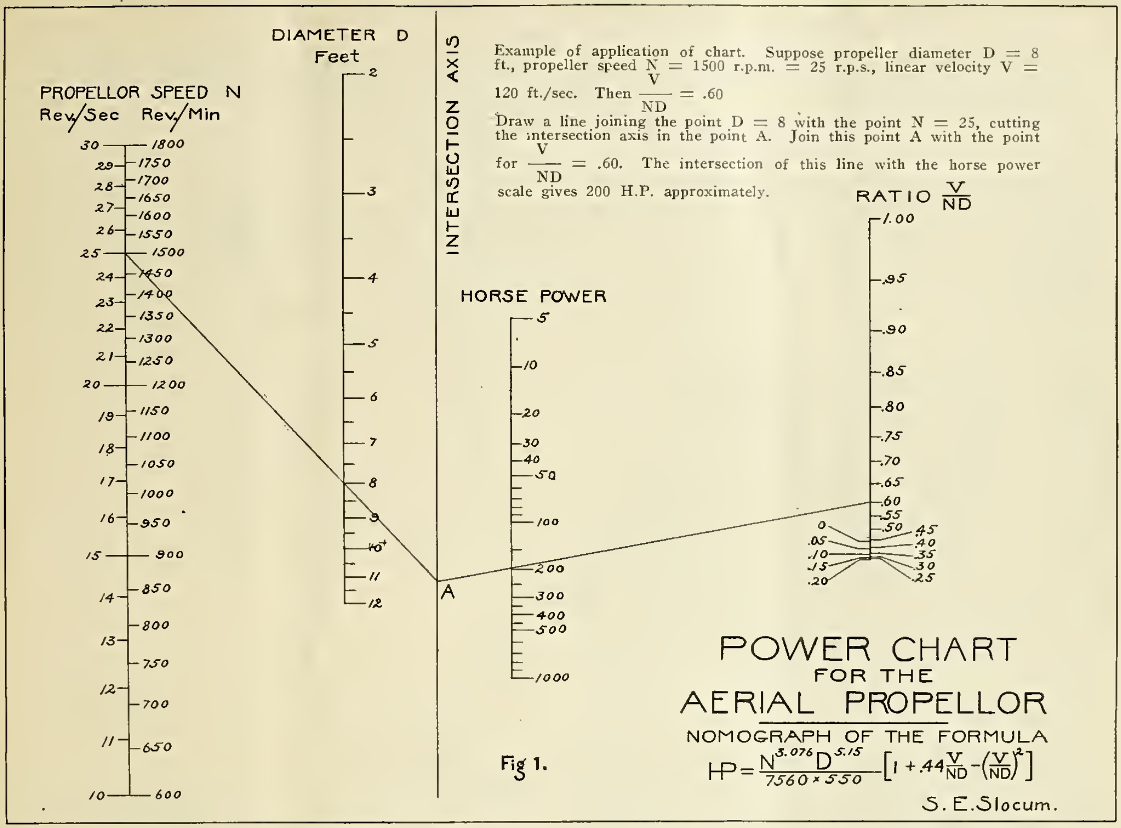
For practical purposes it is more convenient to put all the charts on one sheet, as shown on Plate IV. As an example of its use it may be well to follow through the construction shown on Plate IV. In this example we are given propeller diameter $D = 8$ ft.; propeller speed $N = 1{,}500$ r. p. m. $= 25$ r. p. s.; linear speed $V = 90$ miles per hour $= 132$ ft. per sec. First join $N = 1{,}500$ with $D = 8$, cutting power axis in A and thrust axis in B. Since $\frac{V}{ND} = .66$, join A with this point on the scale $\frac{V}{ND}$ for power. The intercept of this line with the power scale gives H. P. = 180. Next join B with the point .66 on the scale $\frac{V}{ND}$ for thrust. The intercept of this line with the thrust scale gives Thrust $F = 590$ lbs. Now join H. P. = 180 with $N = 1{,}500$. The intercept of this line with the torque scale gives Torque $T = 650$ ft. lbs. Lastly, join the point Thrust $F = 590$ with the point $V = 132$ on the velocity scale, cutting the efficiency axis in the point C. Join this point C with the point H. P. = 180. The intercept of this line with the efficiency scale gives Efficiency = 76 per cent.

Cited for Distinguished Service

First Lieutenant Ralph P. Bagby, Field Artillery, observer, 88th Aero Squadron. For extraordinary heroism in action near Tailley, France, November 1918. Lieutenant Bagby and First Lieutenant Louis G. Bernheimer, pilot, on their own initiative went on a reconnaissance mission, flying 50 kilometers behind the German lines, securing valuable information as to the condition of the bridges across the Meuse River and enemy activity in the back areas and also harassing enemy troops. Home address, R. J. Bagby, father, New Haven, Mo.

Second Lieutenant John B. Lee, 3d., observer, F. A., 24th Aero Squadron. For extraordinary heroism in action near Mezieres, France, November 3, 1918. Lieutenant Lee exhibited extreme courage in the course of a long and dangerous photographic and visual reconnoissance in the region of Mezieres with two other planes of the 24th Aero Squadron. Their formation was broken by the attack of ten enemy pursuit planes; five enemy planes attacked Lieutenant Lee and his pilot. With remarkable coolness Lieutenant Lee succeeded in shooting down two of the planes. They then had a clear passage to their own lines, but turned back into Germany to assist a friendly plane with several hostile aircraft attacking it. They succeeded in shooting down one more of the enemy. Lieutenant Lee and pilot returned to our lines with information and photographs of great military value. Home address, John B. Lee, Jr., father, 667 Highland Avenue, Newark, N. J.

Second Lieutenant Dogan H. Arthur, pilot, Air Service, 12th Aero Squadron. The bronze oak leaf is awarded Lieutenant Arthur for the following acts of extraordinary heroism in action October 18 and 30, 1918, to be worn on the distinguished service cross awarded him October 3, 1918. On October 18, 1918, while on artillery reglage, Lieutenant Arthur and his observer were attacked by four enemy planes. His observer's guns were jammed, but Lieutenant Arthur, with splendid courage and coolness, outmaneuvered the hostile aircraft and escaped, although they followed his plane to within 25 meters of the ground, badly damaging it by machine-gun fire. On October 30, 1918, Lieutenant Arthur was one of a formation of nine planes which were to take photographs in German territory.



Example of application of chart. Suppose propeller diameter D = 8 ft., propeller speed N = 1500 r.p.m. = 25 r.p.s., linear velocity V = 120 ft./sec. Then $\frac{V}{ND} = .60$

Draw a line joining the point D = 8 with the point N = 25, cutting the intersection axis in the point A. Join this point A with the point for $\frac{V}{ND} = .60$. The intersection of this line with the horse power scale gives 200 H.P. approximately.

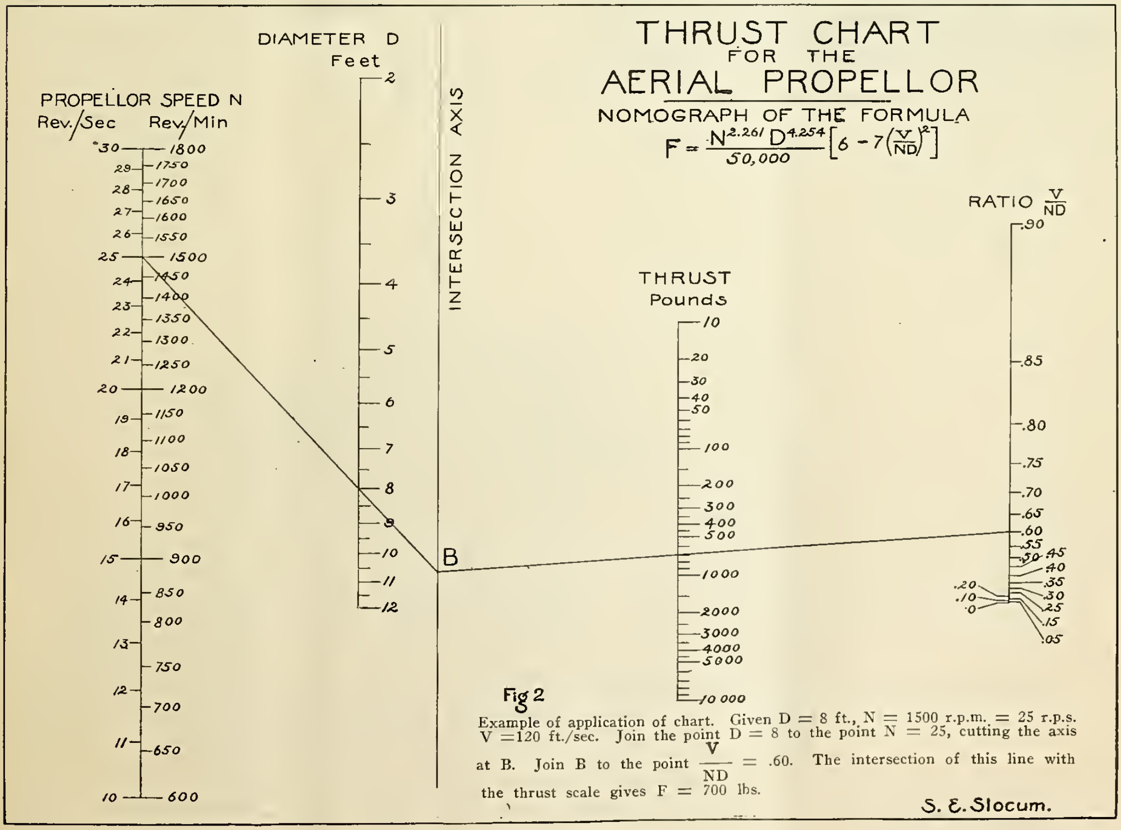
POWER CHART
FOR THE
AERIAL PROPELLOR

NOMOGRAPH OF THE FORMULA

$$HP = \frac{N^{3.076} D^{5.15}}{7560 \times 550}\left[1 + .44\frac{V}{ND} - \left(\frac{V}{ND}\right)^2\right]$$

Fig 1.

S. E. Slocum.



THRUST CHART
FOR THE
AERIAL PROPELLOR

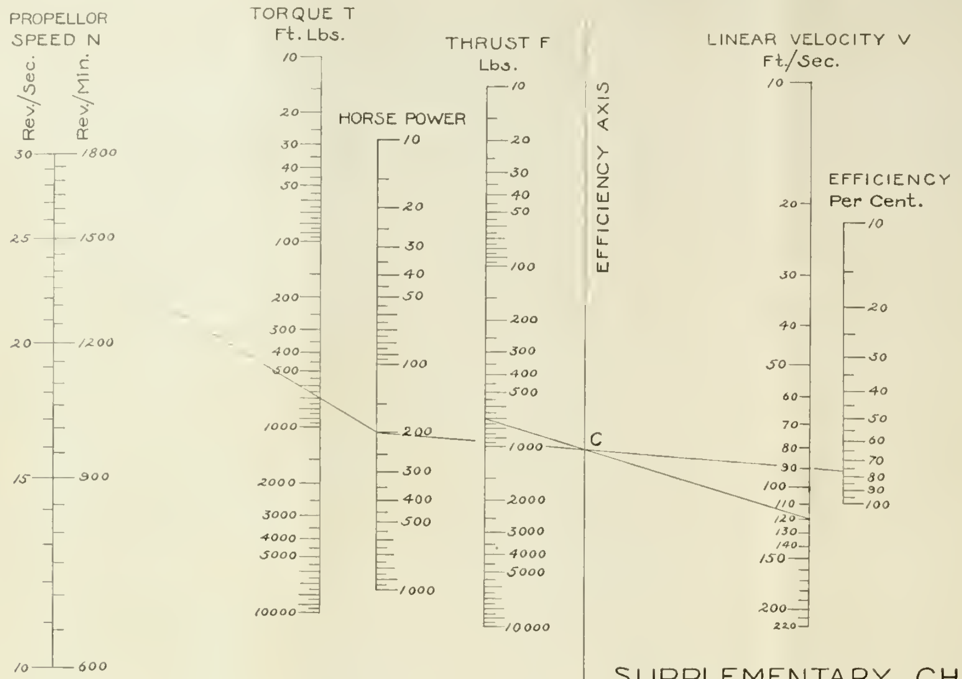
NOMOGRAPH OF THE FORMULA

$$F = \frac{N^{2.261} D^{4.254}}{50,000}\left[6 - 7\left(\frac{V}{ND}\right)^2\right]$$

Fig 2

Example of application of chart. Given D = 8 ft., N = 1500 r.p.m. = 25 r.p.s. V = 120 ft./sec. Join the point D = 8 to the point N = 25, cutting the axis at B. Join B to the point $\frac{V}{ND} = .60$. The intersection of this line with the thrust scale gives F = 700 lbs.

S. E. Slocum.

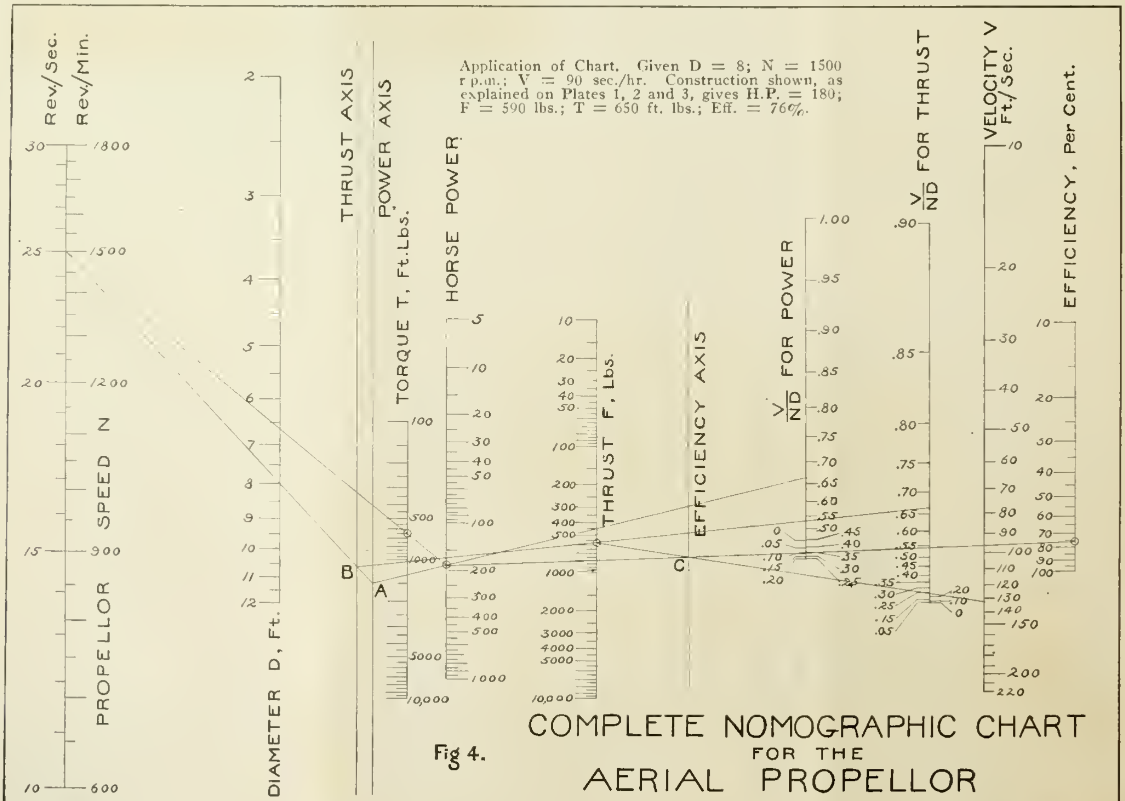


Example of application of chart. 1. Given N = 1500 r.p.m., H.P. = 200. Join these points. Intersection of this line with torque scale gives torque = 700 ft. lbs. 2. Given thrust = 700 lbs., lin. vel. = 120 ft./sec., H.P. = 200. Join F = 700 with V = 120, intersecting efficiency axis in point C. Join this point C with H.P. = 200, and prolong to intersect efficiency scale giving efficiency = 78%.

SUPPLEMENTARY CHART
FOR
TORQUE AND EFFICIENCY

Fig 3.

S. E. Slocum.



Application of Chart. Given D = 8; N = 1500 r.p.m.; V = 90 sec./hr. Construction shown, as explained on Plates 1, 2 and 3, gives H.P. = 180; F = 590 lbs.; T = 650 ft. lbs.; Eff. = 76%.

Fig 4.

COMPLETE NOMOGRAPHIC CHART
FOR THE
AERIAL PROPELLOR

S. E. Slocum.

THE DUESENBERG MODEL H 850 H. P. MOTOR

By G. DOUGLAS WARDROP, M. S. A. E., A. S. M. E.

THE Model H Duesenberg motor, developing 850-900 horsepower, built by the Duesenberg Motor Corporation, of Elizabeth, N. J., is the most ambitious aero engine development that has been attempted, and carried through successfully, in the United States. It was designed by F. S. Duesenberg, the pioneer builder of automobile speed engines, and he had the able assistance and cooperation of William Beckman. The motor is of the sixteen cylinder, V type, with the cylinders at an angle of 45°, and the weight of the power plant with gear drive is 1,575 lbs., without gear drive 1,390 lbs.; remarkably low weight ratio for a power plant of its power.

General Data

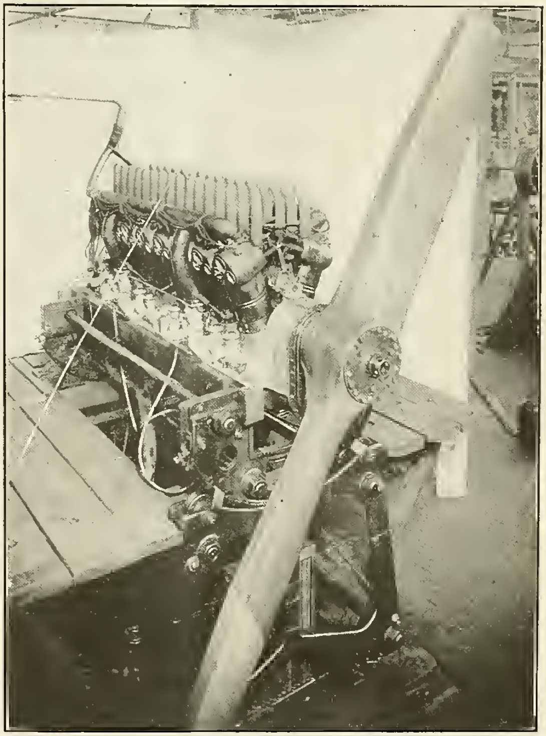
Number and arrangement of cylinders	Sixteen V
Included angle	45°
Bore	6"
Stroke	7½"
Normal Brake Horsepower	800 at 1800 r.p.m.
Type of gear	Overhead camshaft and valve rockers
Number of carburetors	Four Miller

Valves

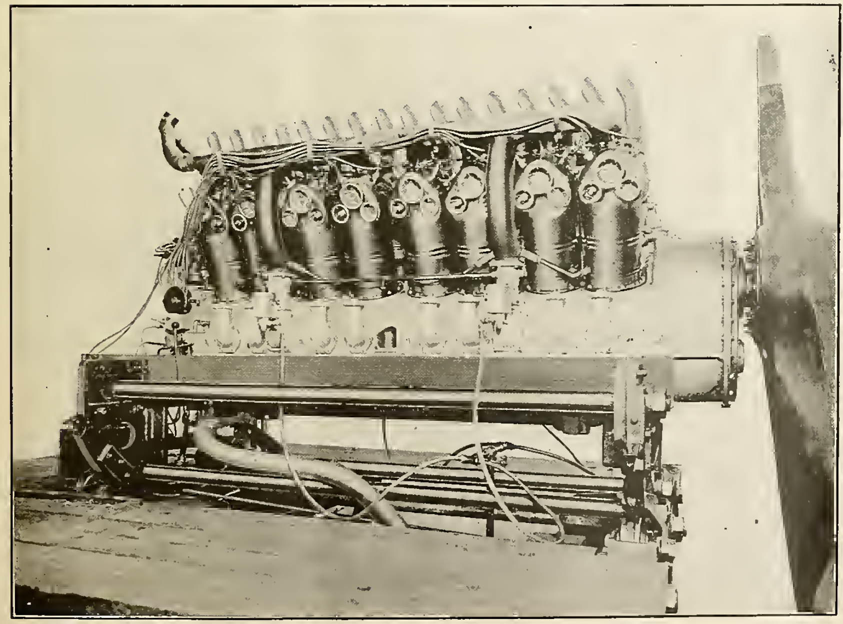
Number per cylinder	One inlet and two exhaust
Outside diameter	Exhaust 2-3/16", Inlet 2-5/16"
Port diameter	Exhaust 1-31/32", Inlet 2-23/32"
Width of seat	7/64"
Angle of seat	30°
Valve lift (inlet)	9/16"
Valve lift (exhaust)	½"
Diameter of stem	Inlet ½", Exhaust 7/16"
Length of valve	Exhaust 6-27/32", Inlet 6⅞"
Number of springs per valve	two concentric
Length of springs in position	Outer 2⅞", Inner 2¾"
Mean diameter of coils (large spring)	1⅛"
Mean diameter of coils (small spring)	1"
Inlet rocker clearance	.010
Exhaust rocker clearance	.015

Cylinders

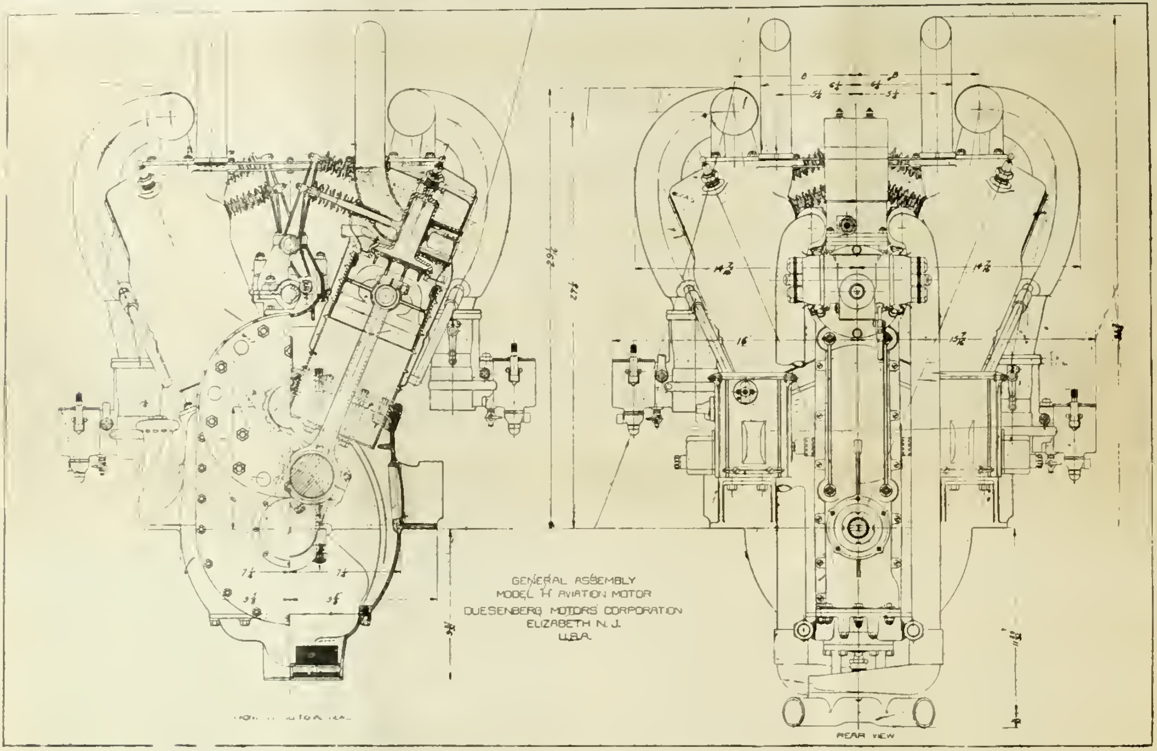
Overall height of cylinders	19-1/16"
Length of projection in crankcase	2¾"
Diameter of cylinder over waterjacket	6-27/32" min.
Diameter of cylinder over waterjacket	7-7/32" max.
Thickness of flange (base)	¼"
Number of studs	9
Thickness of waterjacket	18 gauge
Thickness at cylinder head	7/32"
Thickness of combustion chamber wall	9/64"
Thickness of cylinder barrel	3/32"

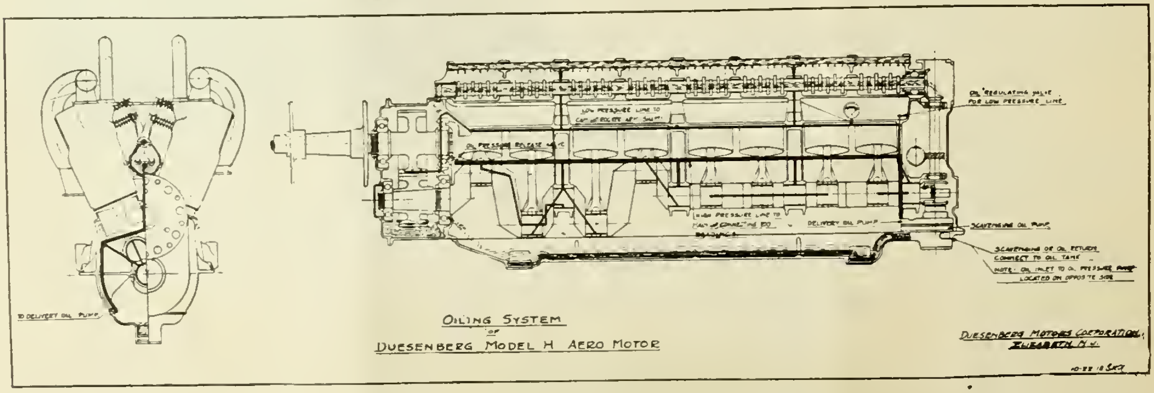


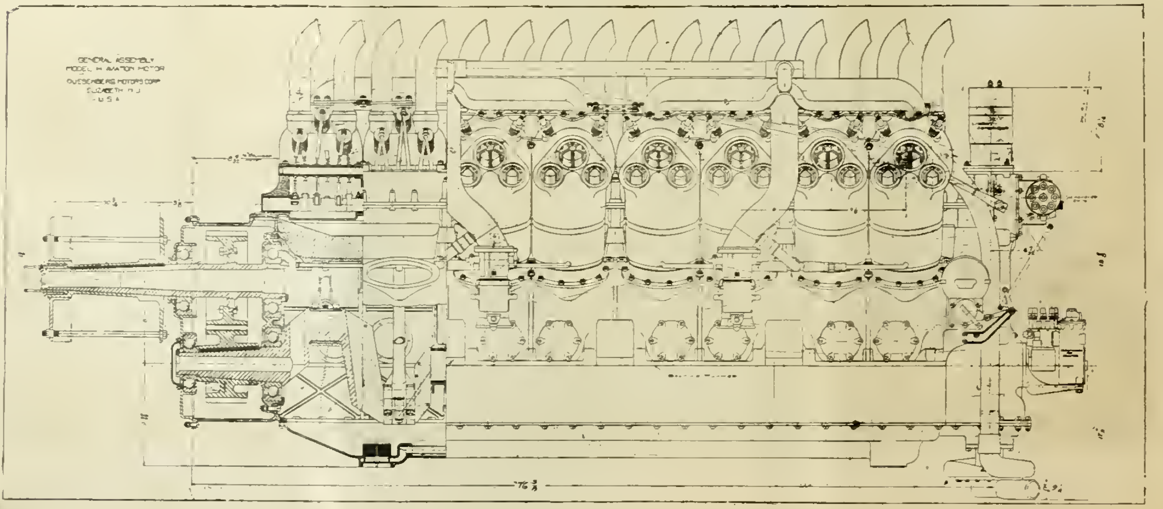
The Model H Duesenberg 850 h.p. aero motor

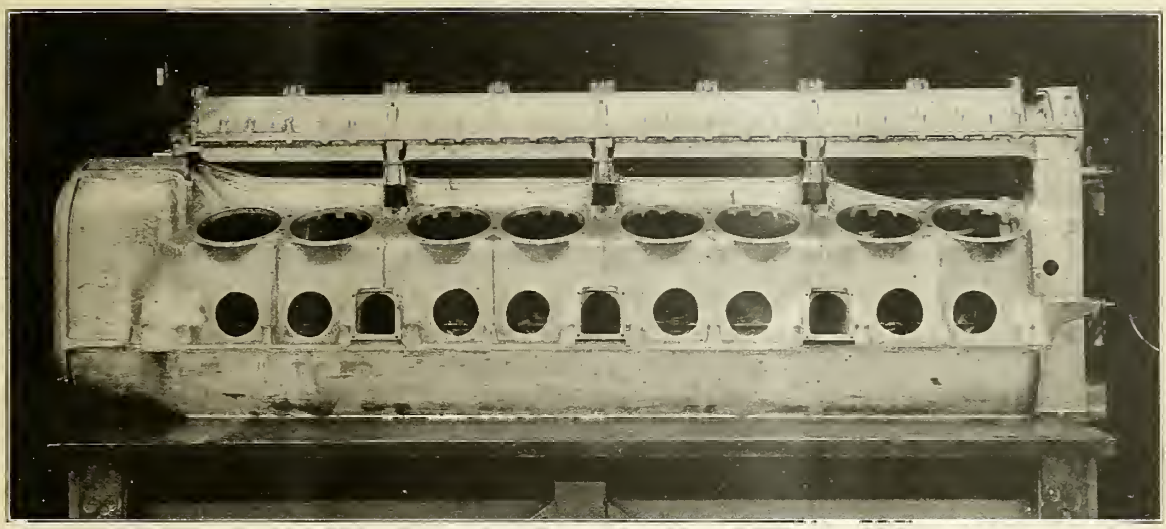


The Duesenberg Model H 850 H.P. aero motor


GENERAL ASSEMBLY
MODEL 'H' AVIATION MOTOR
DUESENBERG MOTORS CORPORATION
ELIZABETH N.J.
U.S.A.
REAR VIEW
29½
7¼
7¼
3⅝
3⅝
16
14⅞
15⅞


OILING SYSTEM
OF
DUESENBERG MODEL H AERO MOTOR
OIL REGULATING VALVE FOR LOW PRESSURE LINE
LOW PRESSURE LINE TO CAM & ROCKER ARM SHAFT
OIL PRESSURE RELEASE VALVE
HIGH PRESSURE LINE TO MAIN & CONNECTING ROD BEARINGS
DELIVERY OIL PUMP
SCAVENGING OIL PUMP
SCAVENGING OR OIL RETURN CONNECT TO OIL TANK
NOTE: OIL INLET TO OIL PRESSURE PUMP LOCATED ON OPPOSITE SIDE
TO DELIVERY OIL PUMP
DUESENBERG MOTORS CORPORATION, ELIZABETH N.J.
10-22-18 SKT


GENERAL ASSEMBLY
MODEL H AVIATION MOTOR
DUESENBERG MOTORS CORP
ELIZABETH N.J.
U.S.A.
76⅜



Crankcase of the Duesenberg Model H Barrel type construction with dry sump oil pan. A strainer is located at forward end connected to oil scavenging pump by tube, thus oil is drained from either end, regardless of angle of flight

Number of reinforcing ribs	7
Thickness of valve ports	.120"
Diameter of port at valve	Intake 2⅝", Exhaust 2"
Number of spark plugs	2 per cylinder

Pistons

Type of piston	flat
Material	Magnalite
Length of piston	5¼"
Number of rings per piston	1 three piece
Position of rings	⅞" to the top groove
Width of rings	½"
Distance from bottom to center of gudgeon pin	2¾"
Thickness of head	3/16"
Thickness of wall at bottom	⅛"
Diameter of gudgeon pin	1¼"
Thickness of gudgeon pin wall	3/16" tapered to 3/72"

Connecting Rods

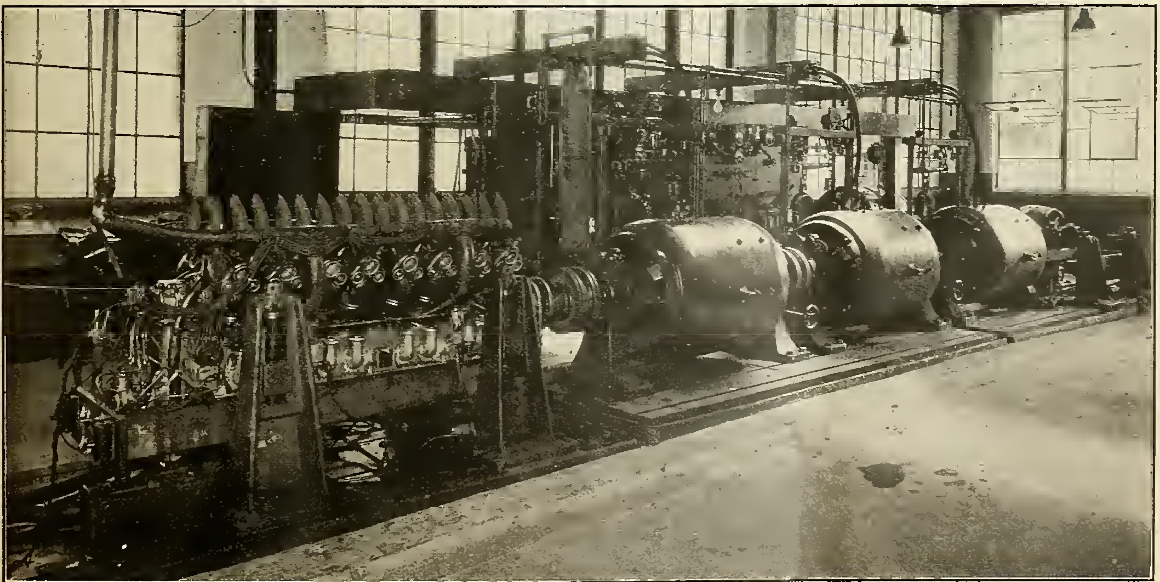
Type	Forked
Length between centers	12¾"
Outside diameter	1⅛" taper to 1-1/16"
Type of section	Tuber
Large end bearing	2⅞"
Inside diameter	3-11/32"
Outside diameter	2⅞"
Thickness of babbit	1/32"

Crankshaft

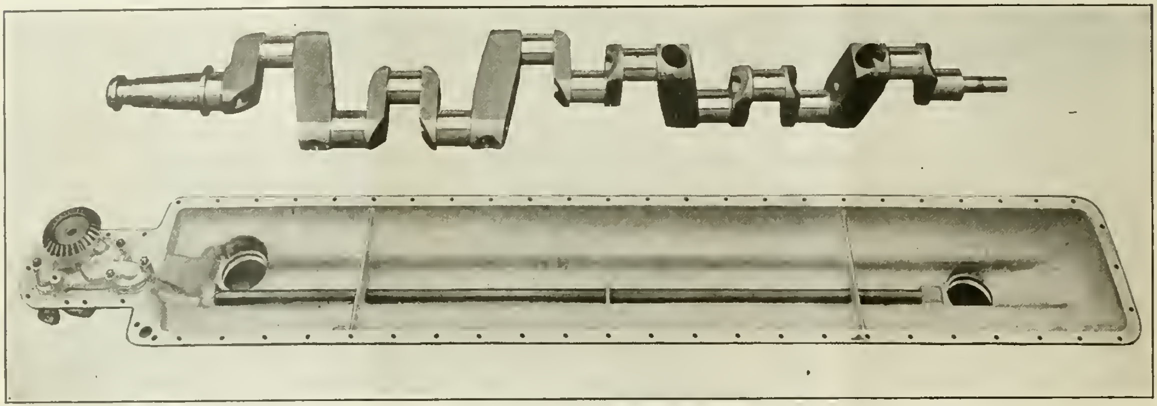
Number of bearings	Four bronze and one ball bearing
Cylinder centers	7"
Crank pins (outside diameter)	2⅞"
Crank pins (length diameter)	3"

Camshaft

Diameter of shaft	1¼"
Inside diameter	¾"
Number of bearings	8
Length of bearing (3 intermediate)	2-3/16"
Width of cam face	7/16"
Number of cams per cylinder	1 inlet and 2 exhaust
P. D. of gear	5"
Number of teeth	40
Width of face	⅝"
Camshaft housing	Barrel type
Material	Aluminum



Duesenberg Model H ready for test on Sprague Dynamometer Equipment



The chrome-nickel crankshaft, forged and machined by Gill, with bearing between every other throw. It is of the hollow type, with oil forced under heavy pressure direct to shaft and connecting rod bearings

P. D. of pinion	2½"
Number of teeth	20
Width of face	⅝"
Diameter of inclined drive shaft	1.183"

Crankcase (Upper)

Material	Aluminum
Thickness of wall	¼" taper to ⅜"
Thickness of cylinder pads	½"
Thickness of supporting flange	⅜"
Center distance of motor support bolts	17¼"

Crankcase (Lower)

Material	Aluminum
Thickness of wall	3/16"

Lubrication

Type	Forced Feed
Type of pumps	Rotary Gear
No. of pumps	1 double pressure and 1 scavenging
Ratio of pump speed to chankshaft speed	1 to 1

Ignition

Type	Battery and generator
Firing order	L: 4-8-2-6-1-5-3-7; R: 1-5-3-7-4-8-2-6
Type of plug	A.C.
Ratio of generator speed to crankshaft speed	2 to 1

Cooling System

Type	Water cooled
Pump	1 centrifugal
Diameter of inlet pipe	1⅝"
Diameter of outlet pipe	1⅝"
Number of outlets	2
Diameter of rotor	5¾"
Ratio of pump speed to crankshaft speed	1 to 1
Water temperature inlet	125 F
Water temperature outlet	155 F

The ignition mountings permit of any standard make magnetos being used and recent motors have been equipped with two 8-cylinder Dixie magnetos of fixed spark and Delco special distributor with battery current furnished by Delco and Liberty generator. The Philbrin battery ignition system has been tested on this engine also with very successful results.

In the cooling system the water is delivered from the pump through two 1⅞" diameter tubes which connect to two headers or manifolds, one along each side and one located directly under the valves near the top of the cylinders. This header is joined to the cylinder by means of the outlet connections. At each cylinder where the water enters is welded a distributor which leads two streams of water, one directly beneath each exhaust port and a third stream to the outside of the cylinder wall or barrel. The water is taken out of the cylinder by means of an opening at the top of the cylinder which

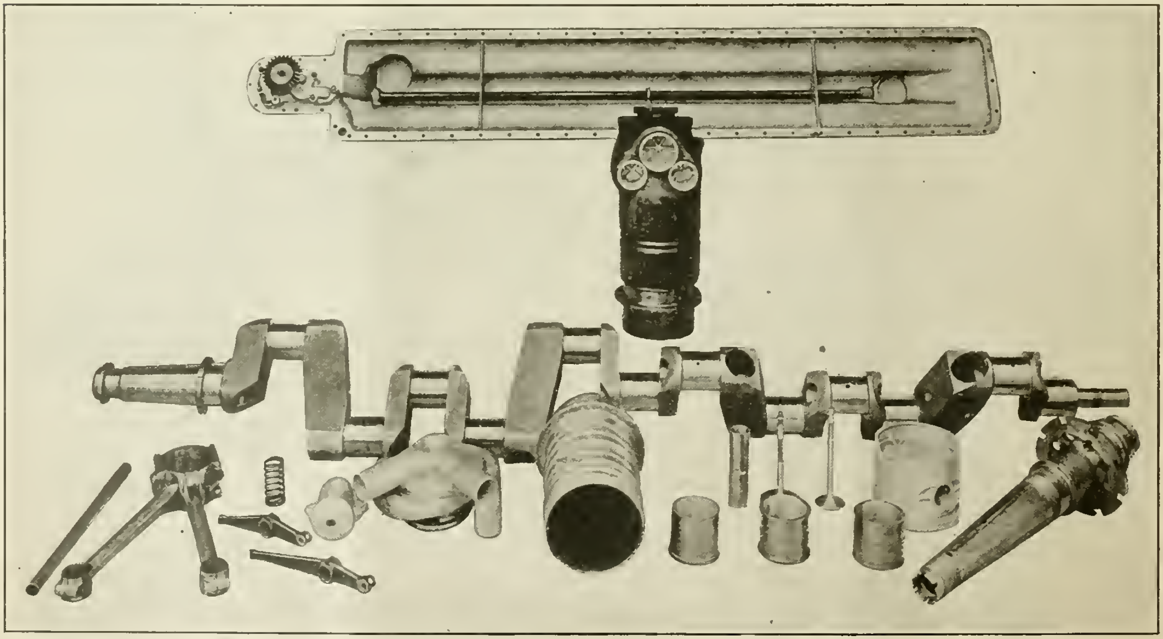


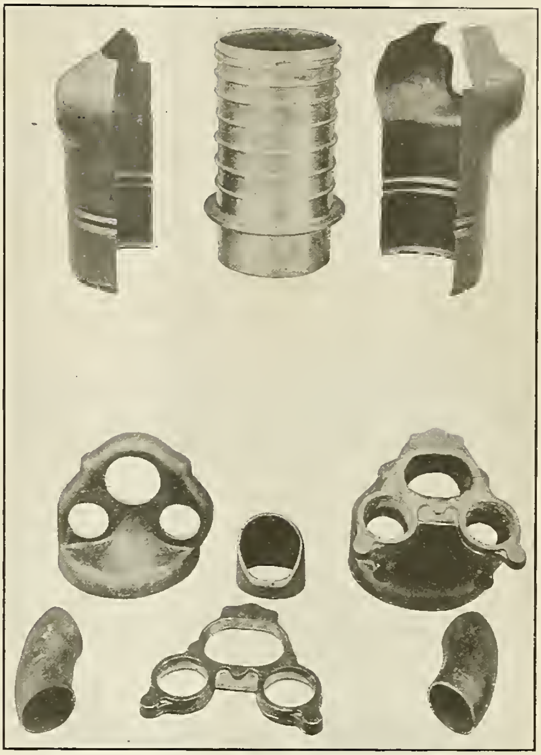
Illustration above shows dry sump oil pan, cylinder, crankshaft, rocker-arm shaft, connecting rod, rocker arms, valve spring, breather tube, water pump, cylinder barrel, bearings, piston pin, valves, and piston

registers with openings and water jacketed gas inlet manifolds; also, a small connection leads the water from the lower part of cylinder jacket to lower portion of water jacket and gas intake manifold. This system permits of a very even temperature, and by tests it has been found that the water pressure is the same at all parts of the motor.

The four Miller carburetors are used, each to feed four cylinders. Two of these carburetors are clamped directly to footings on the crankcase and two are attached to an air duct, which, in turn, is fastened to footings in order to prevent vibration. These footings are of the box girder construction and extend through the width of crankcase and located over each intermediate main crank bearing so that the air to the carburetors is drawn through these footings, which tends to cool the main crank bearings as well as furnish heated air to carburetors.

The rocker arms in the Model H are much shorter than on the normal Duesenberg type. They are of chrome-nickel steel forgings. The camshaft and rocker arm actuating mechanism are entirely enclosed in a dust-proof and oil-proof housing, the oil being fed to both the cams, camshaft bearings and rocker arm shafts under pressure. The rocker arm bearings are of Non-Gran bronze, and the camshaft bearings of babbit lined aluminum.

The oiling system consists of a high pressure and low pressure line operated by a unit of tripe gear pressure and scavenging pumps mounted in the oil pan inside of the crankcase. The high pressure line feeds the crankshaft, connecting rods and thence through a regulating valve to the low pressure line feeding cylinder barrels, cams, camshaft and rocker arms.



The cylinder construction. Barrel of chrome-nickel steel, water jacket of sheet steel, head portion of steel stampings

Cited for Distinguished Service

(*Continued from page* 987)

enemy's concentration was located and military information of great value secured. The bravery of Lieut. Goldthwaite saved the lives of many American soldiers and brought large losses to the enemy. Home address, Mrs. Condace Goldthwaite, mother, Fifth and Garfield Streets, Marion, Ind.

First Lieut. Field E. Kindley, Air Service. In action near Bourlon Wood, France, September 24, 1918. Lieut. Kindley attacked seven hostile planes (type Fokker) and sent one crashing to the ground. A bronze oak leaf is awarded to Lieut. Kindley for the following act in action near Marcoing, France, September 27, 1918. Flying at a low altitude, this officer bombed the railway at Marcoing and drove down an enemy balloon. He then attacked German troops at a low altitude and silenced a hostile machine gun, after which he shot down in flames an enemy plane (type Halberstadt) which had attacked him. Lieut. Kindley has so far destroyed seven enemy aircraft and driven down three out of control. Home address, care of Bank of Gravette, Ark.

Second Lieut. Kenneth L. Porter, Air Service, 147th Aero Squadron. For extraordinary heroism in action near Chateau-Thierry, France, July 2, 1918. Lieut. Porter, with four other pilots attacked 12 enemy aircraft (type Pfalz), flying in two groups well within the enemy lines. As soon as the enemy planes were sighted, Lieut. Porter maneuvered to get between them and the sun and with great difficulty gained the advantage. While three of the other American officers dived on the lower formation, Lieut. Porter and Second Lieut. John H. Stevens engaged the upper formation in a bold and brilliant combat, two planes of which they crashed to the earth. Home address, 105 Green Street, Dowagiac, Mich.

Second Lieut. John H. Stevens, deceased, Air Service, 147th Aero Squadron. For extraordinary heroism in action near Chateau-Thierry, France, July 2, 1918. Lieut. Stevens, with four other pilots, attacked 12 enemy aircraft (type Pfalz) flying in two groups well within the enemy lines. As soon as the enemy planes were sighted, Lieut. Stevens maneuvered to get between them and the sun, and with great difficulty gained the advantage. While three of the other American officers dived on the lower formation, Lieut. Stevens and Second Lieut. Kenneth L. Porter engaged the upper formation in a bold and brilliant combat, two planes of which they crashed to the earth. Home address, Mrs. Effie Stevens, 21 State Street, Albion, N. Y.

Capt. Victor H. Strahm, Air Service, pilot, 91st Aero Squadron. For extraordinary heroism in action near Metz, France, September 13, 1918. Capt. Strahm displayed remarkable courage and skill in penetrating the enemy territory for a distance of 25 kilometers, flying at an altitude of less than 300 meters. His plane was subjected to intense fire from antiaircraft guns in the region of Metz, and he was attacked by a superior number of German planes, one of which he destroyed. He completed his mission and returned with information of great military value. Home address, Frank J. Strahm, Bowling Green, Ky.

First Lieut. Oscar B. Myers, Air Service, 147th Aero Squadron. For extraordinary heroism in action near Cierges, France, September 28, 1918. Sent on a particularly hazardous mission, he harassed and routed enemy troops. Lieut. Myers then climbed higher to look for German planes. With two other officers be encountered nine Fokkers protecting a reconnaissance machine, flying in one of the most effective formations used by the enemy. Outmaneuvering the hostile planes, the three officers succeeded in routing them. After a quick turn Lieut. Myers dived at the reconnaissance machine and crashed it to the ground in flames. Home address, S. Oscar Myers, 109 South Third Avenue, Mount Vernon, N. Y.

First Lieut. William T. Badham, Air Service, observer, 91st Aero Squadron. For extraordinary heroism in action near Nuzancy, France, October 23, 1918. This officer gave proof of exceptional bravery while on a photographic mission 25 kilometers within the enemy lines. His plane was attacked by a formation of thirty enemy aircraft; by skillful work with his machine gun, Lieut. Badham successfully repelled the attack and destroyed two German planes. At the same time he manipulated his camera and obtained photographs of great military value. Home address, H. L. Badham, Whitaker Street, Birmingham, Ala.

First Lieut. George C. Kennedy, Air Service, pilot, 91st Aero Squadron. For extraordinary heroism in action near Jametz, France, October 9, 1918. This officer gave proof of his bravery and devotion to duty when he was attacked by a superior number of aircraft. He accepted combat, destroyed one plane and drove the others off. Notwithstanding that the enemy returned and attacked again in strong numbers. Lieut. Kennedy continued his mission and enabled his observer to secure information of great military value. Home address, L. Gordon Glazier, 4 Egremont Road, Boston, Mass.

First Lieut. Benjamin L. Atwater, Air Service, observer, 99th Aero Squadron. For extraordinary heroism in action near Landres-A-St. Georges, France, October 5, 1918. Lieut. Atwater started on a photographic mission with Lieut. Alexander, pilot, over the enemy's lines. Forced back by seven enemy pursuit planes, he determined to complete his mission, and recrossed the lines eight minutes later. A large group of enemy pursuit machines again attacked his plane. Disregarding his wound, he operated his machine gun with such effect that the nearest of the enemy planes was put down out of control. Home address, Mrs. Ella Atwater, mother, 152 Maple Avenue, Red Bank, N. J.

Second Lieut. William J. Brotherton, Air Service, 147th Aero Squadron. For extraordinary heroism in action near Fere-En-Tardonois, France, on August 1, 1918. An enemy Rumpler plane being reported over the aerodrome, Lieut. Brotherton with another officer ascended and soon encountered six Fokker planes that were protecting another Fokker serving as a decoy. Disregarding the enemy's superiority in numbers, he maneuvered so as to secure the advantage of the sun and dived on the decoy plane; pouring in a destructive fire, he killed the pilot and crashed the machine to the ground. Home address, C. J. Brotherton, Guthrie, Ill.

First Lieut. Lansing C. Holden, Air Service, 1st Pursuit Group. For extraordinary heroism in action near Montigny, France, October 23, 1918. Lieut. Holden was ordered to attack several German balloons, reported to be regulating effective artillery fire on our troops. After driving off an enemy plane, encountered before reaching the balloons, he soon came upon five balloons in ascension 1 kilometer apart. In attacking the first, which proved to be a decoy with a basket, his guns jammed; after clearing them he attacked the second balloon, forcing the observer to jump. His guns again jammed before he could set fire to this balloon. Moving on the third balloon at a height of only 50 meters, he set fire to it and compelled the observer to jump. He was prevented from attacking the two remaining balloons by the further jamming of his machine guns. Home address, L. C. Holden, father, 888 West End Avenue, New York, N. Y.

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In response to this Mr. Deeds received from Mr. Coffin this telegram on the following day:

"1917 May 10 PM 8:56

Darien, Ga.
E. A. Deeds,
New Willard Hotel, Washington, D. C.

Do not hesitate for reasons given. Want your advice and membership on hoard be sure and be on hand for Tuesday and Wednesday next as I desire Board to put up strong program to council on these dates See you Tuesday morning

Howard E. Coffin."

This was followed by a telegram from Mr. Deeds in the following language:

"Washington, D. C.
May 11, 1917.

Howard E. Coffin,
Darien, Georgia.

Will accept membership on the board and be on hand Tuesday and Wednesday.

E. A. Deeds.

Under date of May 17, Mr. Coffin sent to Mr. Deeds a letter in the words and figures as follows:

"Dear Mr. Deeds:

On April 12th, 1917, the following resolution was passed by the Council of National Defense:

'That Commissioner Coffin be asked to take the Chairmanship of an Aircraft Production Board, as outlined in letter of April 10, 1917, of Dr. C. D. Walcott, Chairman Executive Committee, National Advisory Committee on Aeronautics, the personnel of which he shall select

'The National Advisory Committee for Aeronautics have the honor to recommend to the Council of National Defense that a Board be appointed by the Council of National Defense, to be known as the Aircraft Production Board.

'The function of this Board shall be to consider the situation in relation to the quantity production of aircraft in the United States, and to cooperate with the officers of the Army and Navy, and of other Departments interested in the production and delivery to these Departments of the needed aircraft in accordance with the requirements of each Department.'

In accordance with this resolution I desire to ask you to serve as a member of the Aircraft Production Board. The names of the other members who will constitute the personnel of the Board are as follows:

Brig. General George O. Squier, C. S. O.
Rear Admiral Taylor, Bureau of Construction,
Mr. S. D. Waldon
Mr. R. L. Montgomery

and such other additional appointments as future developments may make necessary or desirahle.

I trust I have your acceptance,

Very truly yours,
(Signed) H. E. Coffin.

Mr. E. A. Deeds,
Room 527, Munsey Building,
Washington, D. C."

Mr. Deeds accepted the appointment so tendered him and served on the Aircraft Production Board until August 2, 1917, when he was appointed acting chief of the equipment division of the Signal Corps, at a salary of $1 per year.

On August 24, 1917, Mr. Deeds received a letter from the Adjutant General of the Army informing him that the President of the United States had appointed him temporarily a Colonel in the Signal Corps in the Regular Army of the United States, to rank as such from the 15th day of August, 1917, and instructing him immediately upon receipt of the communication, to return the oath of office properly filled in, subscribed and attested. He accepted this appointment on August 27th, 1917. Before doing so, however, he called upon the Secretary of War and stated very frankly what his business connections were and suggested that if he accepted the commission, he might be criticized, and asked advice from the Secretary of War. He then sent for his attorney, Judge McCann, of Dayton, Ohio, who came to Washington and advised Mr. Deeds what he ought to do with reference to his various activities. This advice was solicited by Mr. Deeds because, to use his own words, he did not "want to do anything that would not he in strict accordance with the law." He left the matter in the hands of his attorney "to finish up." He took immediate steps to sever his connection with the various corporations with which he was affiliated, and on August 28th signed and sent to the Aircraft Production Board and to the Secretary of War letters which had heen prepared by his attorney and which were as follows:

"August 28, 1917.

Hon. Newton D. Baker,
Secretary of War,
Washington, D. C.
Sir:

You have honored me by appointment temporarily as an Officer in the Regular Army of the United States, and as a member of the Aircraft Production Board connected with your Department. It is possihle that that this Board in the development of the aeroplane work may wish to recommend a contract with some of the corporations in which I have had an interest. Following the advice of counsel, I have resigned my official relations with these corporations, and made bona fide transfers of my stock therein to other parties.

For your protection as well as my own, I desire to file with your department a copy of a written disclosure of my relations, both past and present, to these corporations which I have this day filed with the Aircraft Production Board, and I enclose same herewith.

In serving in the positions to which you have appointed me, I desire to comply with both the spirit and letter of the law, and to do no act which might invite criticism upon myself or your department.

I count it an honor and privilege to be thus called into the service of our country, and am pleased to make whatever sacrifice of time and money that service may demand.

I enclose an extra copy of my statement to be filed with you as Chairman of the Council of National Defense.

Yours very respectfully,
(Signed) E. A. Deeds.

"The Aircraft Production Board,
Munsey Building,
Washington, D. C.
Gentlemen:

As a member of your Board and interested in the letting of contracts on the recommendation of that Board on behalf of the Government, I desire at this time to make a full and complete disclosure of the interest I may have in any corporation which might be a party to any such contract, or which might furnish supplies to the Government through the instrumentalities of your board.

I was a stockolder and officer in the following, to wit:

1. The United Motors Corporation of New York, being a union of several companies manufacturing automobile parts.

2. The Dayton Engineering Laboratories Company, of Dayton, Ohio, manufacturing ignition and starting devices for automobiles.

3. The Dayton Metal Products Company, of Dayton, Ohio, engaged among other things, in the manufacture of munitions.

4. The Domestic Building Company, of Dayton, Ohio, a corporation formed for the development of real estate and which now owns the land and buildings leased to the Dayton Wright Airplane Company.

In all of the foregoing corporations I have severed my official connection therewith by resignation and have made a bonafide transfer to other parties of all my stock therein.

In addition to the above corporations, I was an incorporator of the Dayton Wright Airplane Company, but never owned any stock therein. I am also President of and a large stockholder in the Domestic Engineering Company, of Dayton, Ohio, makers of Delco Light Plants, and expect to retain my official connection therewith and my financial interest therein.

I also own the ground embraced in the Moraine Experimental Flying Field.

I make this disclosure now so that your Board, as the representative of the Government, may he fully informed as to my relations, past and present, with these corporations, and be thus enabled to act wisely on any order or contract involving any of those corporations either directly or indirectly. I desire that this written disclosure be recorded in the minutes of your Board for the mutual protection of all of us.

Yours very respectfully,
(Signed) E. A. Deeds."

In response to above written to the Secretary of War Col. Deeds received the following:

"September 2, 1917.

My dear Colonel Deeds:

I have received your letter of August 28th and have directed to be filed in the office of the Assistant and Chief Clerk of this Department the statement submitted by you as to your connection in business which might be in some way concerned in the matter of aircraft production. I feel very sure that this statement and your own wise discretion and good judgment will save us from any embarrassment in the matter, but I cannot send this letter, a mere acknowledgment, without adding to it a word of grateful appreciation for the splendid service which you are rendering the Government, and particularly the War Department. I think it is safe to say that neither our Government nor any other has ever had from its citizens service of more distinguished effectiveness or fineness of spirit than is being rendered by you and your associates in the Aircraft Production Board.

Cordially yours,
Newton D. Baker, Secretary of War.

Col. E. A. Deeds, Aircraft Production Board,
Munsey Bldg., Washington, D. C."

5. The former memorandum from this office based entirely upon the report submitted by Judge Hughes recommended court-martial proceedings against Colonel Deeds by reason of the transactions to which reference will now be made.

I

Telegram Dated September 16, 1917

The telegram referred to was sent by Colonel Deeds from Old Point, Va., to H. E. Talbott at Dayton, Ohio. This is the same Talbott who has been hereinbefore referred to as a former business associate and close friend of Colonel Deeds. At the time the telegram was sent, Mr. Talbott was president of the Dayton Metal Products Company, which owned the stock in the Dayton Wright Airplane Company of which Talbott was also an officer. A contract between the Government and the Dayton Wright Airplane Company for the construction of 3,900 aeroplanes was then in process of negotiation. The telegram is in the following language:

> "For your personal information as coming from your local attorney, Judge Advocate General has ruled it legal for government to select one, contractor one, and the two a third, as appraisers of market value of plant at expiration of contract. If you care to raise the question the above will be found to be the final ruling."

Judge Hughes in his report of the Aircraft Inquiry sets forth the above telegram immediately after two telegrams dated August 4, one from Kettering (also a former business associate of Deeds and largely interested in the Dayton Wright Airplane Company) addressed to Deeds, and the other from Deeds to Kettering. The two telegrams are as follows:

"Dayton, Ohio, August 4, 1917.

E. A. Deeds,
Room 527 Munsey Building,
Washington, D. C.

We believe all confidential telegrams should be sent to Mr. H. E. Talbott, Sr., City National Bank Building, or George B. Smith, instead of the Dayton Wright Airplane Company.

C. F. Kettering."

"August 4, 1917.

Mr. C. F. Kettering,
City National Bank Building,
Dayton, Ohio.

Hereafter all confidential telegrams will be sent to H. E. Talbott, Sr., instead of the Dayton Wright Airplane Company.

E. A. Deeds."

These two telegrams should be considered in connection with other telegrams not set forth in Judge Hughes' report, but which were introduced in evidence in the Aircraft Inquiry.

The request from Kettering to Deeds contained in the first telegram of August 4 hereinabove quoted was caused by the receipt at the office of the Dayton Wright Airplane Company of the following telegram dated August 3, 1917:

"August 3, 1917.

Dayton Wright Airplane Company,
Dayton, Ohio.

The machine about which we talked with Mr. Talbott today will be expressed to Dayton Monday. This must be placed under strictest guard and under no conditions are any visitors to be permitted to see it. Between the time the machine starts and while the machine is in transit please see that your laboratory is so organized that it is under as thorough control as though it were strictly a military research station. This goes far beyond anything that has been done by your organization before, but must be started vigorously and continually maintained. No one outside of Government officials must know where this machine is.

DEEDS—AIRCRAFT PRODUCTION BOARD.

Charge—Aircraft Production Board."

At that time, as is well known, there was great anxiety not only among the various Government officials, but also among private individuals in all parts of the country, especially those connected with plants which were engaged on Government contracts, concerning the activities of German agents in this country. When the telegram of August 3d, above quoted, was received at the office of the Dayton Wright Airplane Company, it was opened by some one connected with the office force, its contents became known, and it was a subject of some discussion among the employees of the company. That company then had several offices, one in the City National Bank Building in Dayton and another at the factory, and there was uncertainty where telegrams would be delivered, which uncertainty would be obviated by addressing telegrams to Mr. Talbott, at the City National Bank Building. For this reason, Mr. Kettering sent the telegram of August 4th. This was followed the next day by the two telegrams of August 4th quoted by Judge Hughes in his report and noted in this memorandum. These two telegrams of August 4 were followed by three telegrams dated respectively August 6, August 13 and August 14, which were in the following language:

"(DeVine Ex 47) (7/12/18)
August 6, 1917.

MR. H. E. TALBOTT, SR.,
City National Bank Building,
Dayton, Ohio.

Plane will be shipped this afternoon or tomorrow. Will advise particulars later.

DEEDS—Equipment Division, S. C.

Charge—Equipment Division, S. C. (Confirming tele, this date).

"(DeVine Ex 49) (7/12/18)

Washington, Aug. 13, 1917."

"MR. H. E. TALBOTT, SR.,
City National Bank Building,
Dayton, Ohio.

Am sending D. H. four drawings by personal messenger on six ten train tonight. Have him met at train this is the only set of drawings in existence arrange special safe to make their safety absolute also when duplicating the D H four at the laboratory make special provision for fire protection by extra watchman and fire extinguishers after you have the drawing work started will send officer from plane design division to assist messenger will also bring standard tracing sheets to be used making D H four drawings so that they will fit into our Standard Government regulations.

DEEDS—Equipment Division."

"(Sherer Ex 38) (7/11/18)
Dayton, Ohio, Aug. 14, 1917.

E. A. DEEDS,
Aircraft Production Board,
Washington, D. C.

Your wire received will be governed accordingly. Plane not yet received.

TALBOTT—Dayton Wright."

A perusal of these telegrams as a series clearly indicates a very proper degree of solicitude on the part of Colonel Deeds zealously to protect the best interests of the Government and negatives the implication raised by Judge Hughes' report that it was the purpose of Colonel Deeds and Mr. Kettering by the telegrams of August 4th to establish improper secrecy in communications passing between them relating to matters in which the Government was concerned.

The history of the transaction calling forth the telegram of September 16th which was adversely criticized by Judge Hughes, is as follows: When negotiations were first entered into between the Government and private manufacturers looking to the production of aeroplanes, a number of serious obstacles stood in the way of concluding the contracts, one of the most important of which was the question of an allowance for depreciation to cover shrinkage in facilities which the manufacturers would be obliged specially to provide. They realized that this shrinkage was something that could not be absorbed in the profits under the contracts. Among those to whom these obstacles appeared most serious were the Curtiss Manufacturing Company and the Dayton Wright Airplane Company. A basis of adjustment had been suggested, as a result of which the Signal Corps adopted the policy of allowing the constructors, at the completion of their respective contracts, amounts of money equal to the difference between the actual cost of the facilities specially provided, and the fair value of these facilities at the completion of the work, these amounts to be fixed by appraisement. The question was then raised as to how the appraisement should be made. There seemed to be an impression prevalent at the time among certain Army officers that the principle which prevented the government from settling disputes by arbitration, negatived its power to allow appraisements to be made either wholly or partially by those unconnected with the Government. Some of the manufacturers insisted that they be allowed to nominate aprpaisers to act in conjuction with the Government apparaisers. It was then decided to submit the question to the Judge Advocate General of the Army. Mr. Montgomery, chief of the consulting department, stated the question to the Acting Judge Advocate General, who orally confirmed Mr. Montgomery's opinion that it would not be illegal to permit the manufacturers to nominate appraisers to act in conjunction with those nominated by the Government. The next day, Mr. Morgan, of the Curtiss Company, was notified, at a meeting of the Aircraft Production Board, of the views of the Acting Judge Advocate General and a contract with the Curtiss Company followed a few days later. The minutes of the Aircraft Production Board show that this meeting occurred on September 14, 1917. The oral opinion given by the Acting Judge Advocate General was confirmed by his letter dated September 19, 1917. Thus it appears that Mr. Morgan, of the Curtiss Company, was advised of this decision of the Acting Judge Advocate General two days before Mr. Deeds communicated it to Mr. Talbott. This is evident from the fact that the telegram to Mr. Talbott was not sent until the 16th of September. It is therefore clear that there was nothing of a confidential character in the information conveyed in Colonel Deed's telegram. Mr. Morgan, of the Curtiss Company, had been advised of these facts at the meeting of the Aircraft Production Board two days before. Such opinions of the Judge Advocate General are as much of a public nature as are the opinions of the Attorney General of the United States. The telegram appears to have been sent in order to expedite the closing of the contract between the Government and the Dayton Wright Airplane Company, a contract which, although dated September 7, 1917, was not actually signed and delivered until October 1st. That it was closed after the opinion of the Acting Judge Advocate General above referred to, is shown by the fact that it contains a clause providing for appraisement in accordance with his opinion. Reading the closing of the contract, production was naturally delayed, and it was advisable from the standpoint of the Government that the Dayton Wright Airplane Company be advised that the differences standing in the way of the final consummation of the contract had been removed.

Why Colonel Deeds, in his telegram, used the language, "as coming from your local attorney," is difficult to understand. The fact probably is that he felt that it would be wiser that Mr. Talbott, in discussing the subject with his associates should not use Colonel Deed's name. As there was nothing confidential in the telegram, there seems to be no reason why the name of Colonel Deeds could not properly have been used, as the source of the information conveyed by it. Colonel Deeds was not the Attorney for the Dayton Wright Airplane Company and is not even at attorney at law. The language, therefore, could not be construed as intended to refer to him as occupying any such relation to the company.

Colonel Deeds' explanation of this phrase is given in this language in the affidavit submitted by him:

> "Deeds' idea was to put the information in such a way that it would not look to Talbott like a proposition from the Aircraft Production Board. The application of the ruling of the Judge Advocate General would obviate the principal objection upon which Talbott was insisting. The idea was to impress upon Talbott the prospect of obviating that objection by further negotiation, through his local attorney at Dayton, who was Charles L. Craighead. Deeds was not acting as attorney or confidential advisor of Talbott, nor was he such attorney or confidential advisor. The purpose was to get Talbott to sign up the Dayton Wright contract which is referred to (P. 29) as dated September 7, 1917, but which, as Montgomery says, was not signed until after October 1, 1917. Production was being held up by delay in signing the contract."

From this explanation it appears that while Colonel Deed's real endeavor was to aid the Government in expediting its program of aircraft production, through some mistaken notion he deemed it proper to accomplish that object by a species of deceit which would result in concealment of the source of the information which the telegram conveyed. This was not only foolish, but provocative of the severe criticism which has been visited upon him and in a manner unjustly.

Upon the evidence now before this office, however, court martial proceedings against Colonel Deeds, based upon this transaction, are not advised, (1) No fraud against the government, nor disclosure of confidential information was intended; (2) None was accomplished; (3) The purpose of the telegram was to expedite the earnest efforts which the government officials were making to speed up aeroplane production.

II

Statement Regarding Transfer of Stock in United Motors Co.

Judge Hughes, in his report, finds that on August 28, 1917, when the letters to the Secretary of War and the Aircraft Production Board, above quoted, were written, Colonel Deeds was the owner of 17,000 shares of the capital stock of the United Motors Company, one of the companies mentioned in the letter to the Aircraft Production Board, and of an interest in a pool of certain shares of the stock of that Company, on which 3,880 additional shares were received in November, 1917. He further finds that the only transfer made by Colonel Deeds of any of his shares in that company was by gift to his wife; that he endorsed for transfer the certificates for 17,500 shares on October 13, 1917, and that they were transferred to Mrs. Deeds' name on October 17, 1917. Thereafter these shares of stock were held by George B. Smith, the confidential agent of Colonel Deeds, for Mrs. Deeds' account. It is further found that entries of the transfers were made in Col. Deeds' books by Smith not earlier than October 17, 1917, and were dated back to August 28, 1917; also in the statement of his assets on August 31, 1917, submitted to him by Smith, the shares appeared as part of his property; that Mrs. Deeds' name first appeared in the statement of assets on October 31, 1917. It is further found that the remaining shares (3,880) received on the dissolution of the pool about November 22, 1917, were transferred from the pool manager directly to Mrs. Deeds, as Col. Deeds' donee, and that the certificates were received by Mr. Smith on her behalf; that prior to the transfer of the stock in October, and at the time of Col. Deeds' letter to the Aircraft Production Board, he had simply told his wife that it was to be her stock, but that it does not appear that there had been an effective gift of the shares. The actual value of the 21,380 shares is found to be approximately $500,000.

It must be remembered that at the time Mr. Deeds received his commission he was in Washington and not in Dayton where his business interests were located. It is obvious that all persons connected with aircraft production in Washington in the summer of 1917 were overwhelmed with work. Col. Deeds could not reasonably have been expected to attend to the details of the stock transfers himself and did not attempt to do so. Nor could it reasonably be expected that he would be required to force upon the market stock worth approximately $500,000, to be disposed of, as would inevitably have been the case, at a sacrifice. It does appear from the testimony taken before Judge Hughes, however, that he did offer for sale his stock in the Dayton Metal Products Co., but apparently without result. It is equally clear that Col. Deeds could not be expected to make a gift of this stock to a stranger. What he testified before Judge Hughes he actually did was to give the stock to his wife. It would undoubtedly have been more frank had he disclosed in his letter that he had given the stock to his wife instead of using the language that he had "made a bona fide transfer to other parties" of his stock. Notwithstanding the fact that the gift was to his wife, it may nevertheless have been intended as a bona fide transfer. His original reluctance to accept service under the Government based upon possible conflicting interests (notwithstanding the pressure brought to bear upon him to do so) evidenced by his telegram to Mr. Coffin and by his subsequent voluntary verbal and written disclosure to the Secretary of War and to the Aircraft Production Board of his business relations, is inconsistent with the thought that he was intentionally guilty of lack of frankness.

As bearing upon his attitude throughout, the subsequent actions of Col. Deeds when the Government had under consideration the acquisition of the tract of land owned by the Moraine Development Co., adjoining the factory of the Dayton Wright Airplane Co., for use as a testing field, may well be considered. Col. Deeds was the owner of approximately 25% of the stock of this development company. The Government believed it to be essential that this field be acquired. Col. Deeds found his

(*Continued on page* 1009)

NAVAL and MILITARY AERONAUTICS

Key to Abbreviations

AAD—Assigned to active duty.
ABC—Report to Army Balloon School, Arcadia, Cal.
ABC—Report to Army Balloon School, Arcadia, Cal.
ADO—Report to Aviation Supply Depot, Dayton, Ohio.
ADT—Report to Aviation Supply Depot, Dallas, Texas.
AFO—Report to Aviation Supply Depot, Fairfield, O.
AGC—Report to Aviation Supply Depot, Garden City, L. I., N. Y.
AHT—Report to Aerial Gunnery School, Houston, Texas.
AIR—Transferred to the Air Service, National Army, without change in rank or date of commission.
ALF—Report to Camp Alfred Vail, Little Silver, N. J.
AMV—Report to Aviation General Supply Depot, Morrison, Va.
AOV—Report to School for Aerial Observers, Hampton, Va.
APR—Report to School of Aerial Photography, Rochester, N. Y.
ARV—Report to Aviation Supply Depot, Richmond, Va.
ASM—Report to Aviation Mechanics' Training School, St. Paul, Minn.
BFT—Report to Barron Field, Fort Worth, Texas.
BRN—Report to Bakers Field, Rochester, N. Y.
BST—Report to Brooks Field, San Antonio, Tex.
CAF—Report to Carlstrom Field, Arcadia, Fla.
CAP—Commissioned as Captain, Aviation Section, Signal Corps.
CDT—Report to Aviation Concentration Camp, Dallas, Texas.
CFT—Report to Carruthers Field, Fort Worth, Texas.
CGC—Report to Aviation Concentration Camp, Garden City, L. I., N. Y.
CGS—Report to Aviation Concentration Camp, Greenville, S. C.
CIT—Report to Radio School, Carnegie Institute of Technology, Pittsburgh, Pa.
CJS—Report to Camp Jackson, Columbia, S. C.
CJW—Report to Camp John Wise, San Antonio, Texas.
CLR—Commissioned as Colonel, Aviation Section, Signal Reserve Corps.
CMV—Report to Aviation Concentration Camp, Morrison, Va.
CPA—Commissioned as Captain Air Service, National Army.
CPR—Commissioned as Captain, Aviation Section, Signal Reserve Corps.
CRI—Report to Chanute Field, Rantoul, Ill.
CSO—Report to the Chief Signal Officer, Washington, D. C.
CUI—Report to School of Military Aeronautics, Cornell University, Ithaca, N. Y.
CWT—Report to Call Field, Wichita Falls, Texas
DAF—Report to Dorr Field, Arcadia, Fla.
DAP—Report to Director of Aircraft Production, Washington, D. C.
DIK—Report to Camp Dick, Dallas, Tex.
DIS—Honorably discharged from service.
DMA—Report to Director of MilitaryAeronautics, Washington, D. C.
ELA—Report to Eberts Field, Loanoke, Ark.
EOT—Report to Ellington Field, Olcott, Texas.
FLA—Commissioned as First Lieutenant Air Service, National Army.
FLR—Commissioned as First Lieutenant, Aviation Section, Signal Reserve Corps.
FLT—Commissioned as First Lieutenant, Aviation Section, Signal Corps.
FOB—Report to Fort Omaha Balloon School, Omaha, Neb.
FRF—On duty requiring regular and frequent aerial flights.
FSO—Report to Fort Sill School for Aerial Observers, Fort Sill, Okla.
GIT—Report to School of Military Aeronautics, Georgia Institute of Technology, Augusta, Ga.
GLC—Report to Gerstner Field, Lake Charles, La.
HHN—Report to Hazelhurst Field, Mineola, L. I., N. Y.
JMA—Rated as Junior Military Aviator.
JRC—Report to Jackson Field, Riverside, Cal.
KST—Report to Kelly Field, So. San Antonio, Tex. (When specified in the order, the number of the field is given in parentheses)
LDT—Report to Love Field, Dallas, Tex.
LHV—Report to Langley Field, Hampton, Va.
MAC—Report to March Field, Allesandro, Cal.
MAJ—Commissioned as Major, Aviation Section, Signal Corps.
MAT—Report to Mather Field, Sacramento, Cal.
MDO—Report to McCook Field, Dayton, Ohio.
MIA—Report to U. S. Naval Air Station, Miami, Fla.
MIT—Report to School of Military Aeronautics, Massachusetts Institute of Technology, Boston, Mass.
MJA—Commissioned as Major Air Service, National Army.
MJR—Commissioned as Major, Aviation Section, Signal Reserve Corps.
MSC—Report to Radio School, Maryland State Agricultural College, College Park, Md.
OBS—Attached to the Aeronautical Service as Observers.
OSU—Report to School of Military Aeronautics, Ohio State University, Columbus, Ohio.
PFO—Report to Post Field, Fort Sill, Okla.
PMT—Report to Park Field, Millington, Tenn.
PUP—Report to School of Military Aeronautics, Princeton University, Princeton, N. J.
PWM—Report to Payne Field, West Point, Miss.
REL—Relieved from present duty.
RSD—Report to Rockwell Field, San Diego, Cal.
RTR—Retransferred to organization attached to previous assignment to aviation duty.
RWT—Report to Rich Field, Waco, Tex.
SBI—Report to Scott Field, Belleville, Ill.
SAG—Report to Souther Field, Americus, Ga.
SGS—Report to Camp Sevier, Greenville, S. C.
SLA—Commissioned as Second Lieutenant Air Service, National Army.
SLR—Commissioned as Second Lieutenant, Aviation Section, Signal Reserve Corps.
SLT—Commissioned as Second Lieutenant, Aviation Section, Signal Corps.
SMA—Report to School of Military Aeronautics, Cambridge, Mass.
SMM—Report to Selfridge Field, Mount Clemens, Mich.
SRC—Report to Columbia School for Radio Officers, New York City.
TFT—Report to Taliaferro Field, Fort Worth, Texas. (When specified in the order, the number of the field is given in parentheses)
TMA—Report to Taylor Field, Montgomery, Ala.
UCB—Report to School of Military Aeronautics, University of California, Berkeley, Cal.
UIU—Report to School of Military Aeronautics, University of Illinois, Urbana, Ill.
UTA—Report to School of Military Aeronautics, University of Texas, Austin, Tex.
VBW—Report to Vancouver Barracks, Washington.
WAC—Report to Aviation Concentration Camp, Waco, Tex.
WCS—Wire to the Chief Signal Officer upon arrival.
WDM—Wire, Director of Military Aeronautics, upon arrival.
WFO—Report to Wilbur Wright Field, Fairfield. Ohio.

Notes

Note 1—Report to places mentioned in the order named.

Note 2—Report to Aviation General Supply Depot, Middletown, Pa.

Note 3—Report to Aviation General Supply Depot, Little Rock, Arkansas.

Note 4—Report to Dist. Mgr., Aircraft Finance, Consumers, Building, Chicago, Illinois.

Note 5—Report to Army Balloon School, Los Angeles County, California, to commanding officer for duty.

Note 6—Report to Dist. Mgr., Aircraft Finance, 360 Madison Avenue, New York City, and by wire to DAP.

Note 7—Report to Bolling Field, Anacostia, D. C., thence to E. O. T. by aeroplane.

Note 8—Report to Commanding Officer, 271st Aero Squadron, Aberdeen, Md.

Note 9—Report to general, Eastern Department, for duty as department Air Service Officer.

Note 10—Report to Speedway, Indianapolis, Indiana.

Special Orders Nos. 310 to 312, Inclusive

A	
Austin, Robert H	CPA
Allen, Arthur F	FLA
Ashby, William T	CAF
Ashe, Harry P	MAC
Ackerman, Herschel D	FLA
Arthur, Dogan H	FLA
Aldrich, Harry S	FRF
Applewhite, Scott Carter	KST
Ackerman, Edwin DeWitt	Note 6
Abbey, Evers	KST
Ashby, William T	DMA
B	
Bahr, Frederick C	DMA
Bartholomew, Robert	MDO
Beeler, George W	MAC
Balinger, Albert J	DMA
Bagley, Harvey B	DMA
Badham, William T	FLA
Brant, Gerald C	EOT
Bridgman, Ray C	DMA
Barnes, James	DMA
Burdick, Jesse Jerome	ELA
Brown, Morris E	ALF
Brewer, Thurlow W	FLA
Brereton, Lewis H	LTA
Bowen, Thomas S	LTA
Besore, Douglas D	FLA
Blakeman, Frederick T	MJA
Bisland, Theodore W	UTA
Boulware, Barrett W	UTA
Bolster, Richard H	BFT
Brooks, Arthur R	FLA
Buckley, Harold R	CPA
Biddle, Charles J	MJA
Bradley, Edgar L	FLA
Byrne, Edward P	DMA
Bloom, Harry Henry	DMA
Bollman, Henry	FLA
Biddle, Charles J	DMA
Baker, Robert L	EOT
C	
Clark, Edward S	FLA
Conklin, David E	CAF
Case, Kenneth B	AMV
Cohen, Abe Wright	DMA
Chapin, Donald A	DMA
Chambers, Reed M	CPA
Cook, Everett R	CPA
Chadbourn, Philip H	DMA
Coate, Roland E	FLA
Chilson, Clinton H	CPA
Condon, Frank Maurice	FLA
Canda, Henry G	CPA
Curry, Howard S	MJA
Crane, Baron D	FLA
Clark, Harold Ames	CPA
Chevalier, John B	FLA
Carter, William R	BFT
Cousins, John W	CPA
Clark, William Henry	RSD
Chisum, Jenner Y	DMA
Cormack, Joseph M	Note 3
D	
Dargue, Daniel L	MAC
Dickman, Frederick T	SAG
Davenport, William H	DMA
Donnelly, Robert Thomas Marie	MAC
Day, Henley F	DMA
Douglass, Kingman	CPA
Dunlap, Edwin W	DMA
Dundore, Charles H	BFT

DeCastro, Ralph E..........FLA
Diekema, Willis A..........CPA
Doten, Lorenzo S..........FLA

E

Egan, T. Francis..........LDT
Este, J. Dickinson..........CPA
Evans, Floyd E..........CPA

F

Flaucher, Asabel J..........BFT
Ford, Christopher W..........CPA
Folger, Lee A..........CPA
Foster, Philip L..........MJA
Fowler, Harold..........LTA
Fleming, William Samuel..........ELA
Foote, Kenneth M..........LDT
Ferson, Oliver S..........CPA
Foist, Carl J..........DMA
Folkner, Arnold F..........CAF

G

Garrison, William H., Jr. Note 2; WDM; Note 1
Gianniny, Lawrence G..........DMA
Garrison, George G..........PMT
Gorrell, Edgar S..........CLA
Glose, Charles W..........BFT
Goodwin, Harold C..........TFT
Galiher, Harry DeMoss..........CPA
Glover, William B..........EOT
Giblon, Earl Z..........DMA
Gilbert, Donald F..........FLA
Gilpatric, John G..........CPA
Grey, Charles G..........CPA
Guilford, Samuel G..........BFT
Gay, Strawn A..........RSD
Goldsborough, William C..........RSD
Guilford, Edward H..........CAF
Gallop, Harold M..........CPA

H

Harwell, Gordon L..........EOT
Henry, Frank M..........FOB
Haldeman, George W..........CAF
Heinrichs, Carl F..........DMA
Heimer, Roy Andrew..........HHN
Hoffman, Edward L..........MDO
Hosp, William W..........LDT
Hutchinson Byron M..........BFT
Hyde, Harley C..........BFT
Hexter, Avrome N..........FLA
Hirst, Barton C., Jr..........FLA
Huntley, James W..........DMA
Hammond, Leonard C..........CPA
Hurt, Samuel F..........UTA
Hassell, Bert R. J..........EOT
Hamilton, Stewart A..........CAF
Hoover, Lawrence E..........PMT
Haslett, Elmer R..........CPA
Hale, Frazer..........CPA
Howell, George R..........DMA
Howard, Earl W. G..........FLA
Hoover, William John..........CPA
Howard, Frank J..........FLA
Heffnor, Roy J..........RSD
Howard, Ten Broeck..........DMA
Heberton, Craig..........LDT
Heath, Charles E..........FLA
Hicks, Samuel C..........FLA
Hill, Charles A..........CPA
Hankey. Albert H..........FLA
Hewes, Harry P..........DMA

J

Jones, Marshall W..........DMA
Jones, Morton V..........DMA
Jones, Parke P..........FLA
Jones, Lloyd T..........MAC
Jones, Carleton C..........CPA
James, Ashby M..........Note 3
Johnson, Leonard H..........DMA
Johnson, Reuben Alford..........MAC

K

Kelly, Arthur H..........FLA
Kirwan, Thomas A..........CPA
Keil, Emil C..........RSD
Kenyon, Hugo A..........FLA
Koenig, Ira R..........CPA
Kleyla, John Raymond..........MAC
Kinne, Howard I..........FLA

L

Lloyd, Charles E..........CPA
Lehr, Robert P..........Note 5
Langston, James A..........MAC
Lake, Chester H..........DMA
Lehman, Harold M..........Note 6
Larner, Gorman DeFreest..........CPA
Lewis, Chauncey G..........DAP
Littauer, Kenneth P..........MJA
Lawson, Walter R..........CPA
Lakin, Paul E..........FLA
Lawler, William Charles..........DMA
Loney, Charles R..........BFT
Lambrix, Otto H..........FLA

M

Munson, Charles C..........Note 4
Morris, Joseph T..........MAC
Mabry, Palmer V..........ASM
Miller, Harry Adelbert..........CGC
Middleton, Ellis P..........DMA
Mills, Byron H..........SRC
Mittendorf, Theodore H..........FLA
Maudlin, Archie A..........LDT
Melin, Charles R..........CPA
Maier, Harmon..........CPA
Menrath, Joseph E..........DMA
Miller, Laurence W..........CPA
Mowry, Rollin I..........MJA

Capt. W. F. Jones, commanding officer of the proving station at Wilbur Wright Field

Meade, Robert W..........EOT
Maddux, Leo Fulton..........LDT
Munsell, Warren P..........CPA

Mc

McCaulley, Edgar L..........DMA
McCammon, Ormsby..........LDT
McDonald, John C..........LDT
McMillin, Gail H..........Note 8
McAleenan, Henry Alvin..........DMA
McClintock, John..........Note 9
McMahon, Joseph B..........LDT
McIntosh, Charles F..........CPA
McEniry, Stephen George..........PFO
McCan, Charles P..........FLA
McGinn, Leo James..........LDT
McKinley, Ashley C..........CPA
McGough, John F..........CPA
McGrath, James L..........CPA
McKinley, Leo G..........FLA
MacDill, Leslie..........LTA
MacWhirter, Donald..........FLA

N

Newman, Nathaniel..........Note 3
Neel, Roland H..........FLA
Niergarth, Omer O..........KST
Nickerson, Truman K..........DAP
Nestle, Joseph H..........CAF

O

O'Rouke, Lawrence James..........PFO
Oliver, William P..........RSD
Oliver, Clarence..........CPA
Overlees, Milo H..........BFT
Owens, Norris W..........CPA
Oberrender, Graaf R..........EOT

P

Palmer, George M..........Note 7
Paquin, Albert J..........BFT
Pratt, Henry C..........KST; WDM; Note 1
Price, Simeon T..........FLA
Prussian, Aaron..........DMA
Powers, Earnest A..........ELA
Pepper, Joseph H..........DMA
Pughe, Earle W..........CPA
Powell, Harford, W. H., Jr..........DMA
Philip, Walter J..........DMA
Page, Victor W..........MJA
Paeglow, John A..........LTA
Powell, Lyle S..........CPA
Parker, Albert N..........FRF
Piercy, James M..........DAP

Q

Queal, William N..........CGC

R

Robertson, William A..........RSD
Rowley, Garold N..........Note 8
Rowe, Charles B..........DAP
Rodgers, Benjamin C..........PMT
Randall, Joseph F..........DMA
Reis, Alvin C..........CPA
Reynolds, John N..........LTA
Rathbone, Claud H..........FLA
Rogal, Edward..........LDT
Rath. Howard G..........FLA
Rucker, Edward Walter, Jr..........CPA
Roper, George M..........ELA
Rockwell, George, Jr..........FLA
Radcliffe, Earle W..........FLA
Rhinehardt, Claude K..........KST
Robertson, Alexander R..........MJA
Reynolds, John R..........CGC
Redman, Mark H..........UTA

S

Street, St. Clair..........CPA
Smith, Allyn G..........RSD
Smith, Walter James..........DMA
Smith, Charles M..........ELA
Smith, Richard..........CPA
Smith, Jonathan Bayard H..........CPA
Shutan, William H..........LTA
Souie, Edgar C..........DMA
Sloan, James..........ELA
Stinson, Edward A..........DMA
Slocum, Paul F..........EOT
Snow, Winter N..........FLA
Spencer, Clarendon R..........PMT
Silver, Eugene..........FLA
St. John, Royal U..........FLA
Seymour, Alonzo M..........FLA
Sisson, Benjamin F..........BFT
Spinney, Byron H..........CPA
Shawhan, Romer..........CPA
Sultan, Thomas P..........FLA
Simon, Louis C., Jr..........FLA
Sousa, William B..........Note 7
Stipp, John C..........FLA
Strahm, Victor H..........CPA
Stevenson, William A..........FLA
Simonds, Francis M..........FLA
Shumaker, Floyd N..........MJA
Sweeley, William R..........EOT
Southee, Earl R..........RSD
Stephens, Robert G..........FLA
Stornhagen, John Meir..........DMA
Sewell, Bruce E..........DMA
Schwartz, Edgar L..........UTA
Simmons, Vernon H..........CPA

T

Tobin, Edgar C..........DMA
Trowbridge, Jones R..........DMA
Tobin, Edgar C..........CPA
Thaw, William..........DMA
Thompson, Homer T..........BFT
Thorp, George B..........FLA
Tourison, Edward G..........CPA
Tomkins, Sterling..........FLA
Taylor, Thorne C..........CPA

U

Upman, Frank..........CPA

V

Vierling, George William, Jr..........FLA
Valentine, Everett M..........EOT
Vanderpool, Charles H..........DMA

W

Willis, Eppa Hunton..........DMA
Wade, Robert M..........DMA
West, Henry..........DAP
Waste, James A..........Note 4
Wash, Carlyle H..........MDO
Warfield, Robert L..........DMA
Wiggins, Grafton..........EOT
Williams, Isaac J..........MAC
Williams, John G..........Note 7
Winne, Irving K..........DMA
Wentworth, John..........CPA
Wyman, Oliver B..........CPA
Wilson, Donald Ray..........ELA
Walker, Edward W..........RSD
Weston, Harold W..........RSD
Wynn, William B..........MJA
White, Horace W..........CPA
Wingate, Harry L..........CPA
Warren, Harry P..........CPA
Watson, Henry L..........MAC; WDM; Note 1
Welty, Clair W..........FLA
Wilson, Ray Q..........DMA
Walker, Kenneth N..........BFT
Williams, Philip L..........BFT
Wales, Edward V..........RSD
Woody, Albert M..........FLA

Y

Yount, Burton K..........RSD

Cited for Distinguished Service

The commander in chief, in the name of the President, has awarded the Distinguished Service Cross to the following named officers and soldiers for the acts of extraordinary heroism described after their names:

Sergt. (First Class) Fred C. Graveline, 20th Aero Squadron, first day bombardment group (A S. No. 20083). For repeated acts of extraordinary heroism in action near Villers-Devant-Dum, France, and Mouzon, France, September 29 and November 5, 1918. Volunteering to act as observer and aerial gunner because of the shortage of officer observers. Sergeant Graveline started on seventeen bombing missions, successfully reaching his objective on fourteen of these expeditions, shooting down two enemy aircraft. On two occasions, while flying in the rear of his formation, he drove off superior numbers of German machines. Home address, Mrs. Josephine Graveline, wife, 537 Main Street, Springfield, Mass.

Capt. Christopher W. Ford, Air Service, 103d Aero Pursuit Squadron. For repeated acts of extraordinary heroism in action near Rheims, Farnce, March 27, 1918, and near Armentieres, France, May 21, 1918. Near Rheims on March 27th Captain Ford, while on a patrol with two other pilots, led his formation in an attack on eight enemy planes. After twenty minutes of fighting, the American formation shot down three German machines, of which one was destroyed by this officer. Near Armentieres on May 21st he again led a patrol of six planes in attacking twenty enemy aircraft. The attack resulted in ten individual combats. Captain Ford shot down one hostile plane and with his patrol routed the others. Home address, Mrs. Harriet Chuff, aunt, 462 West One hundred and thirty-first Street, New York City, N. Y.

FOREIGN NEWS

75,105 French Fliers in War

Paris, Jan. 15.—It is now permitted to give details of the progress of French aviation. When the war started there were twenty-one squadrons, 321 pilots and a total personnel of 4,342.

At the end of 1916 the personnel had increased to 75,105, the pilots numbering 6,417 and the observers 1,682. The aviation program in July, 1918, brought the number of machines to more than 6,000.

Credits voted for the French aviation service in 1914 were about $11,000,000. This sum was quadrupled in 1916, and by 1917 had exceeded $65,000,000.

Australia-London Flight Being Prepared for in Melbourne

Melbourne, Jan. 13.—A company has been formed under the name of the Aerial Service Limited of Australia to finance an aerial transport flight from Australia to London. The voyage will be made by way of the Dutch East Indies and Bagdad. The air line from Australia to London is perhaps 2,000 miles shorter than any of the routes used now.

British Ocean Flight Plan

London, Jan. 9.—The *Daily Mail* announces that several aeroplanes are under construction in different parts of Great Britain and with the assistance of the Air Ministry are planning to attempt a transatlantic flight.

The *Daily Mail* says the Air Ministry is less anxious to demonstrate that a single machine can fly across the Atlantic than that a group of machines of various types can do so. Consequently machines of more than one type are under construction in anticipation of their flying across next Spring.

Raids On England Cost 1,570 Lives

London, Jan. 11.—In raids on England by the Germans during the war, 5,511 persons were killed on injured, of whom 4,750 were civilians. The deaths numbered 1,570. An official summary of the casualties caused by German airships, aeroplanes and bombardments from the sea shows the secasualties among civilians:

Killed, 554 men, 411 women, 295 children.

Injured 1,508 men, 1,210 women, 772 children.

Three hundred and ten soldiers and sailors were killed and 551 were injured.

There were fifty-one raids by airships, causing the deaths of 498 civilians and the injury of 1,236, and the killing of 58 soldiers and sailors and the injuring of 121.

In fifty-nine aeroplane raids 619 civilians were killed and 1,650 were injured. In these raids 238 soldiers and sailors were killed and 400 wounded.

The greatest losses inflicted by Zeppelins were in raids on Norfolk, Suffolk and the home counties of London on October 13, 1915, when 54 civilians and 17 soldiers and sailors were killed, and in West Suffolk and the midland counties on January 31, 1916, when 70 civilians were killed and 112 injured. The raid on Lincolnshire, Essex and Suffolk on March 31 of the same year caused the death of 17 civilians and 31 soldiers and sailors.

The most serious aeroplane raid was that of Margate, Essex and London, on June 13, 1917, when 158 civilians and four sailors and soldiers were killed. The next in severity was that of Kent, on September 4 of the same year, when 131 soldiers and sailors lost their lives. On this occasion a crowded barracks was hit. Almost as severe as the raid on Kent was that on Folkestone, on May 25, 1917, when 77 civilians and 13 sailors and soldiers were killed. The attack on Kent, Essex and London on January 28, 1918, caused the death of 65 civilians and two soldiers and sailors.

Edward W. Beatty, President of the National Advisory Committee, Canada, who is also President of the Canadian Pacific Railway

"Aeroplane Spies" Informed Gen. Diaz

Rome, January 3.—During the period just before the great Italian offensive started considerable attention was attracted to the extraordinary accuracy of the knowledge of affairs behind the Austrian lines in possession of Gen. Diaz and his staff. It is now known that much of this exact information was secured by men who were dropped in enemy territory by Italian aeroplanes and, after an interval for observation, picked up and brought back by aviators.

During the three months just prior to the launching of the Italian drive eighty men were engaged in this perilous work. All of them had thrilling adventures and experiences. The story of Captain Romiati may be taken as representative of what might be related by any of them.

Captain Romiati served as a doctor in an Austrian hospital for ten days, and later made his escape in the guise of a cattle dealer. Lieutenants Maso and Tubero were arrested as spies, but managed to overpowe their guard and escape.

The first of the "aeroplane spies" was Giacomo Camillo de Carlo, a Venetian, who volunteered for the dangerous work. Before the war he was head designer for a widely known firm of modistes in Paris. He was a bold and resolute officer and in addition owned some property in the invaded district, where he was well known and loved by the peasants. He was carried across the Austrian lines in an aeroplane, taking with him a number of carrier pigeons. These he liberated from time to time with messages to the Italian staff. He was sheltered by the peasants, but was at last detected and forced to flee. He made his way to the seacoast and managing to get a rowboat reached an Italian port.

His success led to the formation of a regular service among bold young Italian officers. This was known as the "Giovane Italia" and played an important part in preparing for Italy's final victory.

Prince of Wales Flies in U. S. Plane

Coblenz, Jan. 11.—A flight over the Coblenz bridgehead area, a luncheon with Major-Gen. Muir and a dinner dance occupied the time to-day of the Prince of Wales who is the guest of Major-Gen. Dickman, commander of the American Army of Occupation.

The Prince professed keen pleasure in his visit to the American aerodromes and the aeroplane trip was at his request. He went up with Brig.-Gen. William Mitchell, Chief of Air Service of the Third Army. It was Gen. Mitchell's last flight at Coblenz as he is leaving for duty in the United States.

The Prince was in the air for forty-five minutes. He was taken up the Moselle, across the Rhine and then flew down the Rhine from the Lorelei rock to Neuwied, returning to the aerodrome near Coblenz. The flight was made in a two seater Spad. The Prince studied the maps during the entire flight and talked with Gen. Mitchell. He declared afterward that the flight was the most picturesque he ever had.

Albert's Plane Disabled

Paris, Jan. 11.—King Albert of Belgium, flying yesterday morning with Albert Combez, the noted Belgian aviator who finished fourth in the international aeroplane race at Rheims in 1913, was forced to land two miles from Attigny on the Aisne when the motor stalled.

Both occupants of the machine escaped injury and the plane was undamaged.

Britain Plans Air Industry Subsidies

London, Jan. 8.—The British Government may subsidize the air industry to give it the necessary financial stability for rapid peace time commercial development. The air subsidy plan is being considered by the air ministry among other proposals.

Under subsidies it is hoped private concerns will be building thousands of commercial planes and operating them as mail and passenger carrying vehicles. This, it is pointed out, would insure employment to thousands of expert aviators trained during the war. Furthermore, it would enable Great Britain at all times to have an immense air fleet at her disposal, together with the necessary trained aviators.

The success of the subsidy plan, as it has worked out in connection with the merchant marine and the motor lorries, is being cited as a strong argument in favor of air subsidies.

When war was declared, Great Britain had at her disposal thousands of merchant craft, many which were quickly transferred into the fighting strength of the navy immediately. Hundreds of motor lorries were sent to France from London and other cities were cited.

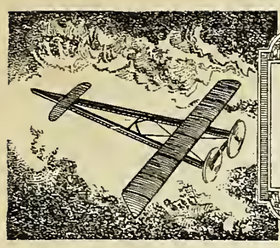
Germans Reluctant to Give Up Aeroplanes

London, Jan. 14.—Germany is surrendering the aeroplanes required by the armistice terms with reluctance. The total number to be delivered to the Allies in good and serviceable condition is as yet far from having been reached. German machines were simply left behind without guards in the aerodromes, and as the British advancing cavalry patrols reached them, guards were posted. In many cases the cavalry found the machines damaged or deficient in instruments or parts, and the question arises whether they were so left by the Germans or whether they had suffered owing to souvenir-hunting propensities of the civilian population.

This point is being investigated with strict impartiality. On the British sector the proportion of large bombing planes—only about twenty were left by the Germans—is very small. This emphasizes the German comprehension of the commercial possibilities of converted bombers.

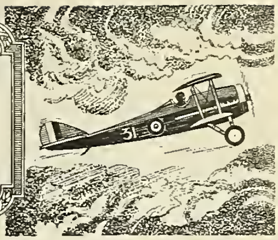
The total number of German aeroplanes collected by the Royal Air Force is just over 500. It does not follow that anything like the whole of this number will be accepted as coming within the armistice definition of "in good condition." Only a small proportion are immediately flyable, and when it is established the Germans left defective machines they will not be accepted. About 170 of the total number were abandoned in open railway trucks and were, of course, left dismantled, a clear evasion of the terms. Both these and those machines which were left in the aerodromes suffered from exposure. In two cases the Germans handed over groups of machines to local municipal authorities, insisting on receipts and declarations that they were received complete, and the enormous work caused to the Royal Air Force by this haphazard manner of surrender will be realized.

Only at Nivelles were the German aeroplanes handed over in the regular manner. Nearly all these were of the newest Fokker type, though there were some Albatross scout, Pfalz, and two Junkers. These last are armored trench fighting machines with wings of corrugated aluminum, and have a pair of machine-guns which fire through the floor of the observer's cockpit.



ELEMENTARY AERONAUTICS *and* MODEL NOTES

By John F. McMahon



Model Aeroplane Building as a Step to Aeronautical Engineering

THE plate showing Tail and Rudder surfaces accompanying this article was fully described in the January 20th issue of AERIAL AGE and no more need be said about these parts, but it is well to stop here and consider what these parts do and how we arrive at the figures. For instance the tail is for the horizontal control of the machine and each movement of the elevator flaps causes the machine to go either up or down, as the case may be.

Now to anybody who has studied simple Physics of Elementary Mechanics, what is to follow will be easily understood, but I would like those who have not had the above-named studies in their school life to read this article carefully and to try to understand it. This will not be at all hard because I have made everything so simple that I will be surprised to hear that anyone has failed to grasp these fundamentals.

The body of an aetroplane is like a great lever, the fulcrum or balancing point is located on paper by the use of mathematics. Of course we could easily find the balancing point if the machine were built but we must draw up our machine and balance it before building it or we would not be able to locate our wings, landing chassis, tail, etc.

To locate the center of gravity of an aeroplane proceed as follows:

Draw a side view of the machine and for accuracy make it one inch to the foot. Locate a point one inch from the outside of the propeller. This is the point about which our figures will be drawn. Now we will say our propeller weighs 19 pounds and the center of gravity of it is on a line through the center. Now we assumed that one inch equalled a foot then the propeller is one foot from our point and we write:

$$19 \times 1 = 19$$

Again we have the radiator, 50 pounds, whose center of gravity is located 1½ feet from the point and we write directly under the above:

$$50 \times 1\frac{1}{2} = 75$$

The motor with ignition carbureter, etc., weighs 200 pounds and the center of gravity is located (owing to the magneto being connected to the rear) a trifle behind the vertical center line of the engine, then the C. G. of this body is located about 2½ feet from this point and we write:

$$200 \times 2\frac{1}{2} = 500$$

The landing chassis weighs 30 pounds, and is four (4) feet from our mark so we write:

$$30 \times 4 = 120$$

The C. G. of the body is 8 feet from the point and the weight is 65 pounds, so we write:

$$65 \times 8 = 520$$

The wings complete weigh 80 pounds and the C. G. is 5 feet back, so we write:

$$85 \times 4\frac{1}{2} = 382\frac{1}{2}$$

The pilot, 185 pounds, and located 7 feet from the mark:

$$185 \times 7 = 1{,}295$$

The tail and rudder works weigh approximately 20 pounds, the C. G. being 17 feet from the point

$$20 \times 17 = 340$$

Listing these we have as follows:

Propeller	19	×	1	=	19
Radiator	50	×	1½	=	75
Engine	200	×	2½	=	500
Landing chassis	30	×	4	=	120
Body	60	×	7	=	420
Wings	80	×	4½	=	382½
Pilot	175	×	6	=	1,050
Tail and rudder	20	×	17	=	340
	634				2,926½

dividing the sum of the last column by the sum of the first column we have

$$2{,}926\frac{1}{2} \div 634 = 4.6 \text{ feet approximately.}$$

Then the center of gravity of the whole machine is located 4 feet 7 inches from the point or subtracting the one foot space between the propeller and the point, the C. G. of the whole machine is 3 feet 7 inches from the propeller.

Now that we have located the center of gravity we know where our center of lifts of the wings must be, and that is in line with the C. G., or a little behind it. We can then safely call the C. G. the balancing point, axis or fulcrum of the aeroplane. The lift of the wings acts on the aeroplane, like a string fastened to an object at its center of gravity. If no outside force is acting on the object it will remain in its original state, but if you wanted to move it some force must be applied to move it in the direction wanted and this is what the rudder, tail flaps, and ailerons do.

If the aeroplane is left alone it will hold a certain course (we will forget the action of the wind to simplify matters) because there is as much weight to the rear of the C. G. as there is to the front (not in actual weight but in moments) which causes the machine to remain balanced. To change this direction or to move the object, as it were, we move the ailerons, rudder, or tail flaps which causes a pressure on these parts and moves the machine.

The aspect ratio of our rudder is 1.5 because it has an average of 3 feet in height and is 2 feet wide. The table which I presented in an earlier article says that the Ky or lift coefficient for flat plates aspect ratio 1.5 at 30° (which is the furtherest point that our controls will go) is .00198.

Our rudder having approximately 6 square feet of surface it will have a force at 60 m.p.h. of

$$.00198 \times 6 \times 3{,}600 = 513 \text{ pounds}$$

Now this force acts at a distance of approximately 12 feet from the C. G. and the real force is

$$42.75 \times 12 = 513 \text{ pounds.}$$

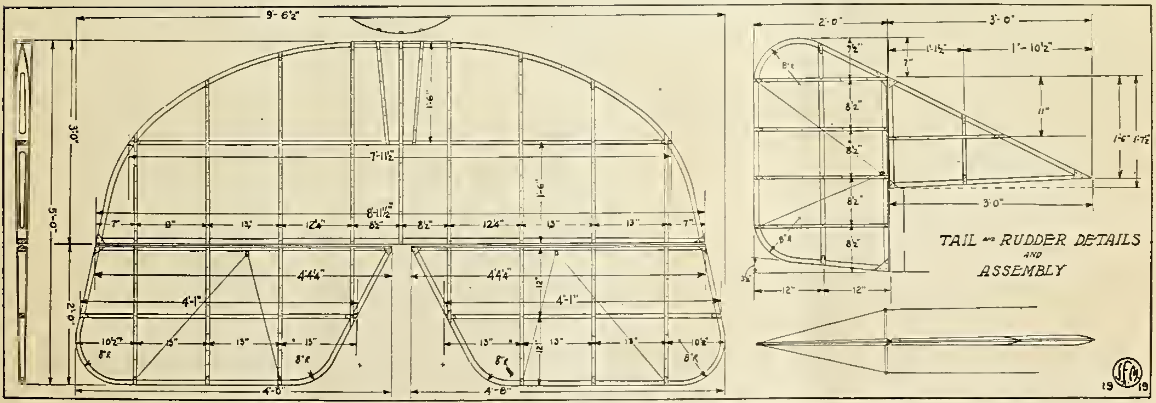
The 513 pounds is the force the rudder exerts when turning the machine.

To keep the machine from turning too sharply a damping effect is produced by placing a fixed fin just in front of the rudder which also holds the machine on a steady course.

The ailerons are figured the same way, only the moment arm is figured to the center of the ailerons instead of to the center of pressure as in the rudder. When an aeroplane is turning the outside wing gets more lift than the inside wing and causes the plane to bank heavily. This is because the outside wing is traveling faster and is covering more ground than the inside wing. By moving the aileron control so that the outer wing gets a negative action and the inner wing a positive, this banking effect is neutralized. The lateral balance of the machine is also taken care of by the ailerons.

The tail flaps are figured exactly as we figured the rudder, only we have two working instead of one. The horizontal stabilizer also acts as a damper much the same as the fin does and when the pilot pulls or pushes the control stick the machine answers surely but not too quick as would be the case if no stabilizer were used. The reader can readily see how the aeroplane body resembles a directional lever.

(To be continued)



Details of the stabilizer, elevators, fin and rudder for the Ford Motored Aeroplane

Aeronitis is a pleasant, a decidedly infectious ailment, which makes its victims "flighty," mentally and physically. At times it has a pathologic, at times merely a psychologic foundation. It already has affected thousands; it will get the rest of the world in time. Its symptoms vary in each case and each victim has a different story to tell. When you finish this column YOU may be infected, and may have a story all of your own. If so, your contribution will be welcomed by your fellow AERONUTS. Initials of contributor will be printed when requested.

There was an old man of the Hague,
Whose ideas were excessively vague;
He built a balloon,
To sail to the moon,
And escape from the prevalent plague.

"Willie, we're saved," spoke the All-Highest. "I read that, according to Mr. J. A. Whitehead, it will be possible to fly to the Mid-Atlantic and alight on a floating station."

"Yes, but that's only for week-enders, All-Highest," replied the clown price, "and, anyway, I don't like the idea of water, water, all around, and not a drop to drink, as the ancient mariner hath it. Think of something better, Pa."

King of the Air

When I dance my little son on my knee,
I think of the wonders that he will see.
This bright-eyed baby just one year old,
With his sunny smile and his hair of gold.

Will my baby fly in the air one day?
Fly under the rainbow arch so gay?
Will the winds and the clouds no terrors hold,
In the age of aircraft, when all are bold?

Will he travel the world in years to be,
Swift journeying over the land and sea?
Will he laugh at time and the leagues of space,
As he drives his aeroplane on apace?

Will my baby fly in the air? Ah! yes,
And he'll see more wonders than I can guess—
My little baby, just one year old,
With his eyes of blue and his hair of gold.

I Doubt It

When a pair of red lips are upturned to your own,
With no one to gossip about it,
Do you pray for endurance to leave them alone?
Well, maybe you do—but I doubt it.

When a sly little hand you're permitted to seize,
With a velvety softness about it,
Do you think you can drop it with never a squeeze?
Well, maybe you can—but I doubt it.

When a dear little waist is in reach of your arm,
With a wonderful plumpness about it,
Do you argue the point, 'twixt the good and the harm?
Well, maybe you do—but I doubt it.

And if by these tricks you should capture a heart,
With a womanly sweetness about it,
Will you guard it, and keep it, and act the good part?
Well, maybe you will—but I doubt it.

Instructor to Cadet (after his usual wreck): "Why didn't you level off?"

Cadet: "Because the altimeter still showed one hundred feet."

Girl friend to ground officer: "What is a Keewee?"

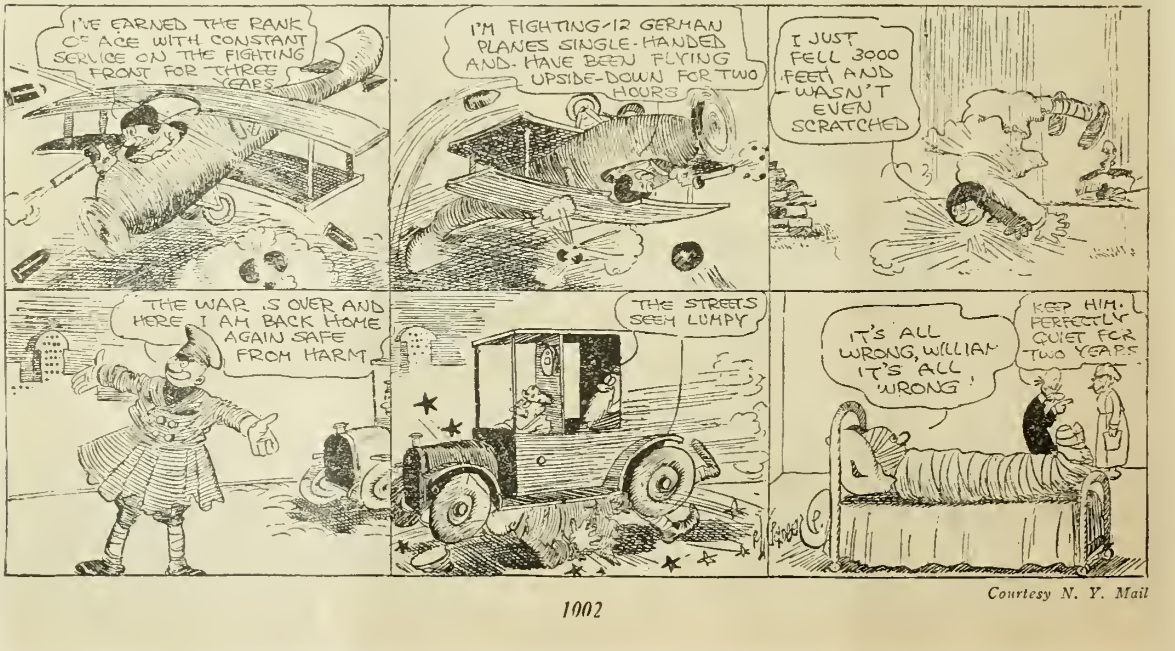
Ground officer: "An Australian bird that does less flying than any other, but gets there just as fast."

Radio Sergeant: "Can you stay behind me two letters?"

Class: "Yes, a whole hour, at least."

It's All Wrong, William, It's All Wrong

By Goldberg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I'M FIGHTING 12 GERMAN PLANES SINGLE-HANDED AND HAVE BEEN FLYING UPSIDE-DOWN FOR TWO HOURS
I JUST FELL 3000 FEET AND WASN'T EVEN SCRATCHED
THE WAR IS OVER AND HERE I AM BACK HOME AGAIN SAFE FROM HARM
THE STREETS SEEM LUMPY
IT'S ALL WRONG, WILLIAM IT'S ALL WRONG!
KEEP HIM PERFECTLY QUIET FOR TWO YEARS

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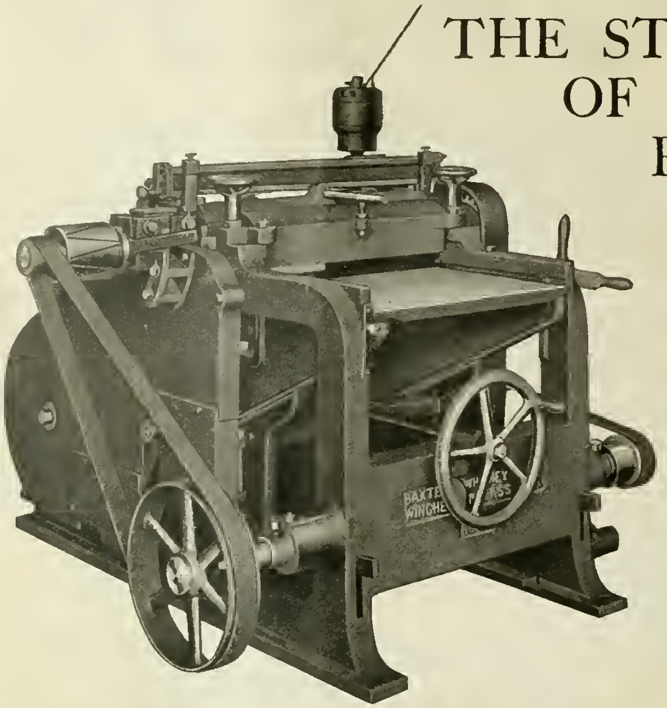

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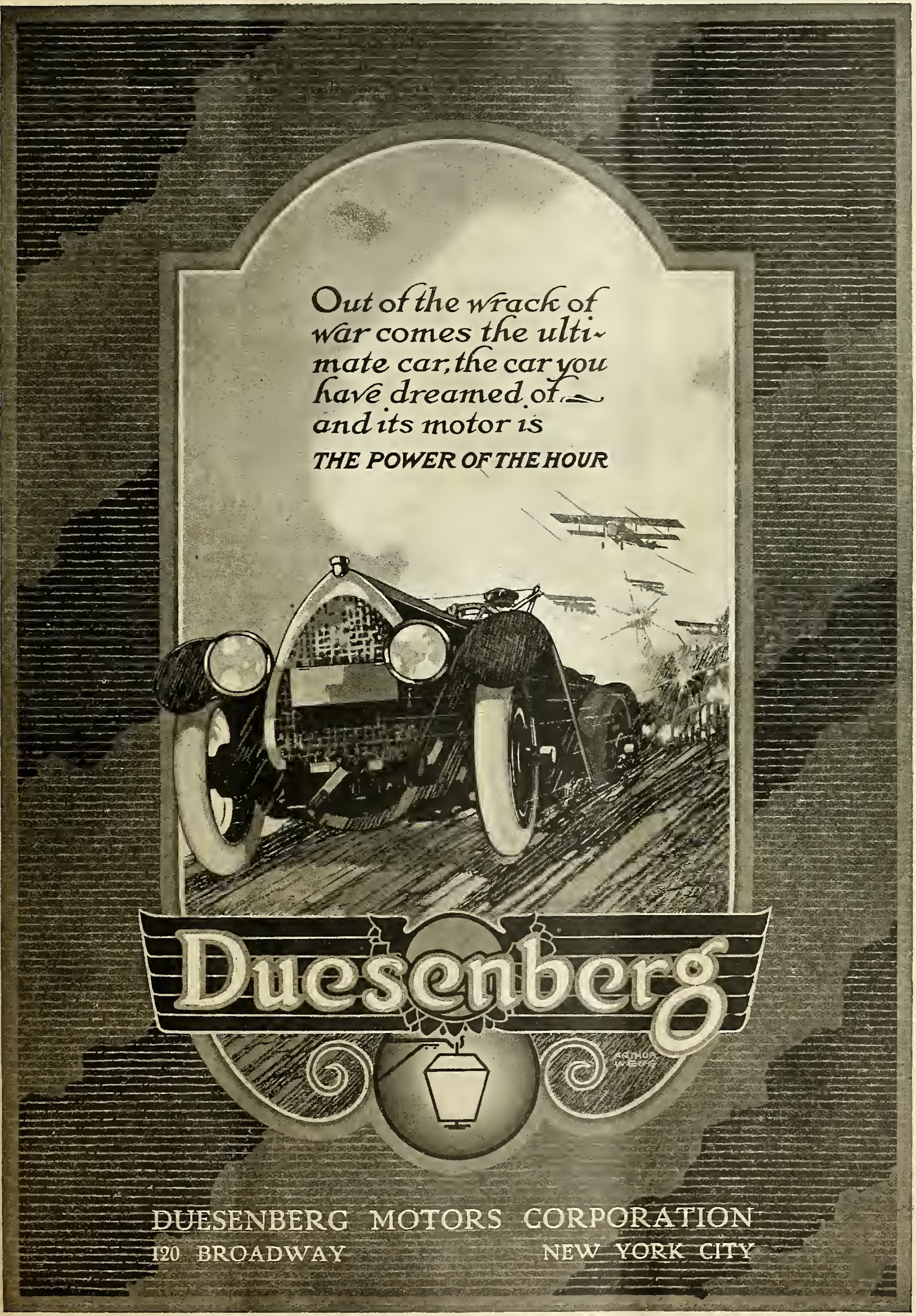
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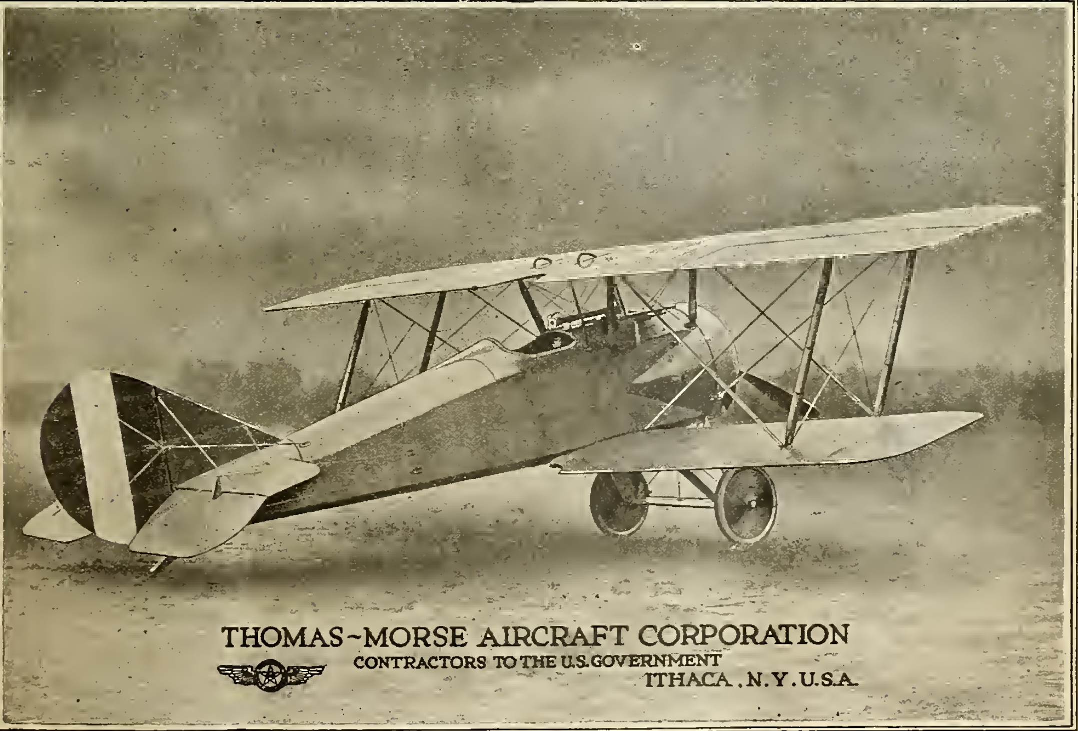

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(Continued from page 997)

financial interest in it a source of much embarrassment to him, as it was also a source of embarrassment to the officers of the Signal Corps to whom he had disclosed it. Col. Deeds discussed various plans by which he could divest himself of his interests in the company in such manner as to leave no ground for criticism. He felt that he was not justified in asking his associates to lease the ground for a nominal rental, because the largest stockholder, Mr. Schantz, represented not only his individual interest but that of the Schantz Estate, in which there was a large number of beneficiaries.

The matter was under discussion in the Department for several months and was finally referred to Mr. Montgomery of the Advisory and Consulting Committee, who, under date of June 28, 1918, wrote an opinion to the effect that if it were not for the criticisms and insinuations so extensively made with reference to the connection of Colonel Deeds with the operations at Dayton, there would be no objection to the form of lease which had been proposed, and that these criticisms suggested the advisability of unusual caution. His opinion continued with the statement that as the transaction was entirely outside the jurisdiction of Colonel Deeds and he would have no connection direct or indirect, with letting or recommending the contract, unless possibly in his capacity in connection with the Aircraft Board, Mr. Montgomery could see no legal reason why Col. Deeds' interest in the Moraine Development Co. should interfere with the transaction. Col. Deeds was not satisfied with this, however, as will appear from a letter written to Mr. Schantz by Mr. Montgomery under date of July 25, 1918, suggesting that in view of Colonel Deeds' sensitiveness to criticism, he would like to know from Mr. Schantz if a lease could not be made for a nominal consideration merely. It was shortly after this that the Hughes investigation commenced.

Returning now to the consideration of the transfer by Col. Deeds to his wife of the stock in the United Motors Co., it will be seen that what Col. Deeds really did with this stock and other stocks, is disclosed by the affidavit of George B. Smith, the financial representative of Col. Deeds, and Mr. Kettering. From this affidavit it appears that the facts, briefly recited, are these:

About August 16, 1917, Col. Deeds had stated to Mr. Smith that he had given all his interest in the United Motors Co. to his wife, and directed Smith to have it transferred to her. The certificates of stock were in Mr. Smith's custody in Dayton, and the transfer agent was the Guaranty Trust Company of New York. Not having time to give the matter his immediate attention, and because Col. Deeds was spending all his time in Washington, with the exception of week end visits every two or three weeks, the actual endorsements on the certificates were delayed until October 13, 1917, when they were endorsed by Deeds, and Smith then took them to New York and had them transferred to Mrs. Deeds on the books of the Corporation. While in New York he made demand for the pool stock referred to by Judge Hughes, which stock Smith had several times demanded in order that the stock might be transferred to Mrs. Deeds, but he was informed that the stock was not ready for delivery. Prior to going to New York on this occasion Smith notified Mrs. Deeds that he was going there to have the stock transferred to her name on the books of the corporation, and Smith stated that Mrs. Deeds appeared to know all about the transaction, and to understand that the transfer was to be made. After the transfer was made, Smith himself, who had previously been accustomed to looking after Mrs. Deeds' business affairs, kept the certificates for her, and Col. Deeds had no control over them. When the pool certificates were finally transferred to Mrs. Deed's name, Smith also kept them for her. The stock transferred to Mrs. Deeds was less than 2% of the capital stock of the United Motors Corporation.

The statement of assets made by Smith under date of August 31, submitted to Colonel Deeds, was intended to show and did show the condition of Colonel Deeds' interests as they appeared on the books of the various corporations concerned. As the stock had not been actually transferred on the books, the United Motors stock appeared on that statement to stand in the name of Colonel Deeds.

Judge McCann, the counsel for Colonel Deeds, who has been hereinbefore referred to, in an affidavit submitted herewith states that the plan of action for Colonel Deeds to pursue had been outlined by him (McCann); that McCann prepared all the documents in connection therewith, including the two letters to the Aircraft Production Board and the Secretary of War; that the language of the documents was his own; that the work was done under pressure, without opportunity for mature deliberation; that Colonel Deeds' appointment had been made; that there was apparently great need for haste in all departments of aircraft work, particularly the work of production; that Colonel Deeds' instructions were to take such steps promptly as might be necessary to carry into effect the plan decided upon; that on his return to Dayton Mr. McCann instructed Mr. Smith to make the formal transfer of the stocks as of the date of Colonel Deeds' resignation; that because of Colonel Deeds' incessant labors at Washington and his enforced absence from Dayton it took some weeks to carry this plan into effect; that the plan was fully carried out as originally intended, except as to the stock of the Domestic Building Company, which will be referred to later; that there was no reason for deceiving anyone, and no intention to deceive; that all the transactions had been in absolute good faith; that Colonel Deeds had lost heavily financially by reason thereof; and that the Government had profited greatly by the service Colonel Deeds had rendered.

The whole attitude of Col. Deeds from the time he was first approached with the request that he give the government the benefit of his services, up to the time when the investigation was commenced, taken in connection with his large financial sacrifices in relinquishing salaries aggregating $85,000 a year, as well as interests in the various companies with which he had been connected, precludes the thought that he was guilty of conduct unbecoming an officer and a gentleman in that "with intent to deceive" he officially stated to the Aircraft Production Board that he had made bona fide transfers of his stock in the United Motors Company, knowing this statement to be false. It will be observed that the "intent to deceive" is an essential element of the offense.

It is recommended that no court-martial proceedings be instituted against Col. Deeds based upon the statements in his letters to the Secretary of War and the Aircraft Production Board so far as they concerned the transfer of his stock in the United Motors Co., because: (1) Col. Deeds at the date the letter was written had made an informal gift of the stock; (2) he had instructed Judge McCann to arrange promptly the necessary transfer; (3) the actual transfer was delayed because of Colonel Deeds' absence from Dayton, necessitated by his continuous and unremitting labor for the Government at Washington; (4) the formal transfer was subsequently made; (5) there was a total absence of intent to deceive

(To be continued)

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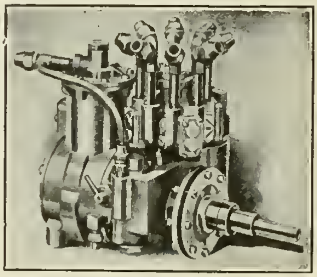

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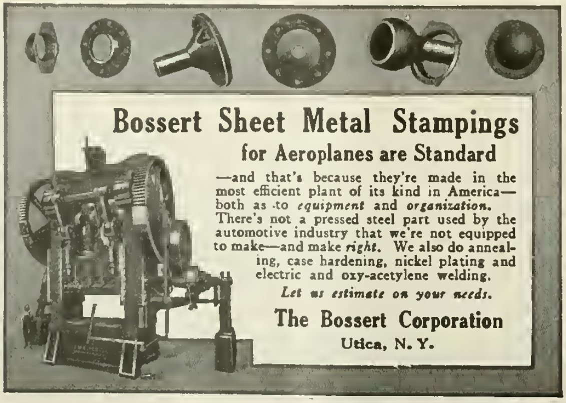

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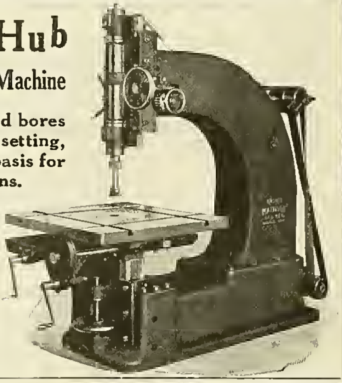

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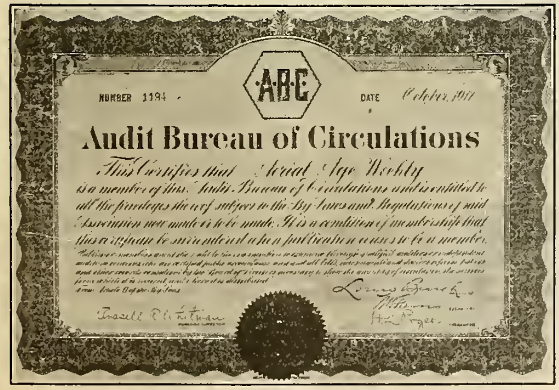

NUMBER 1194 A·B·C DATE October, 1917

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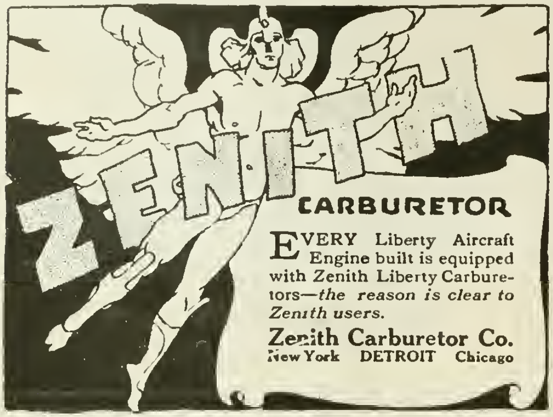

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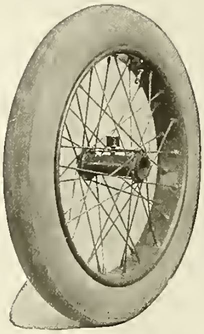

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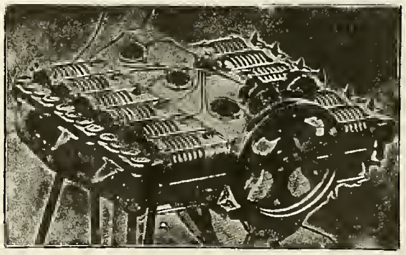

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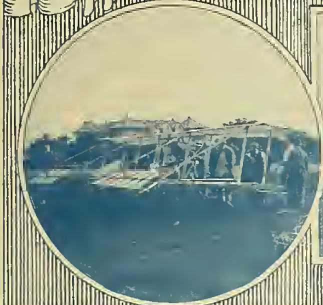
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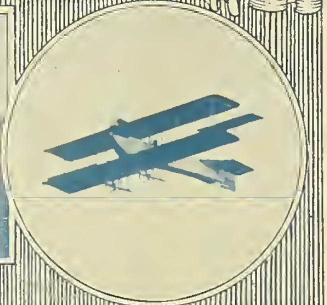
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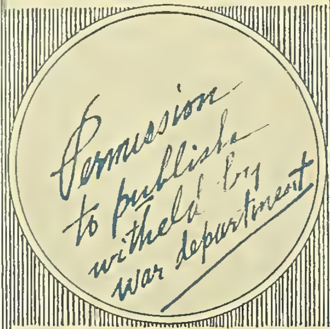
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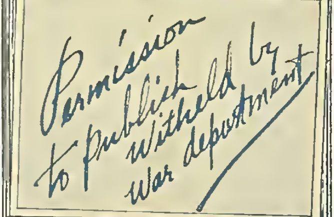
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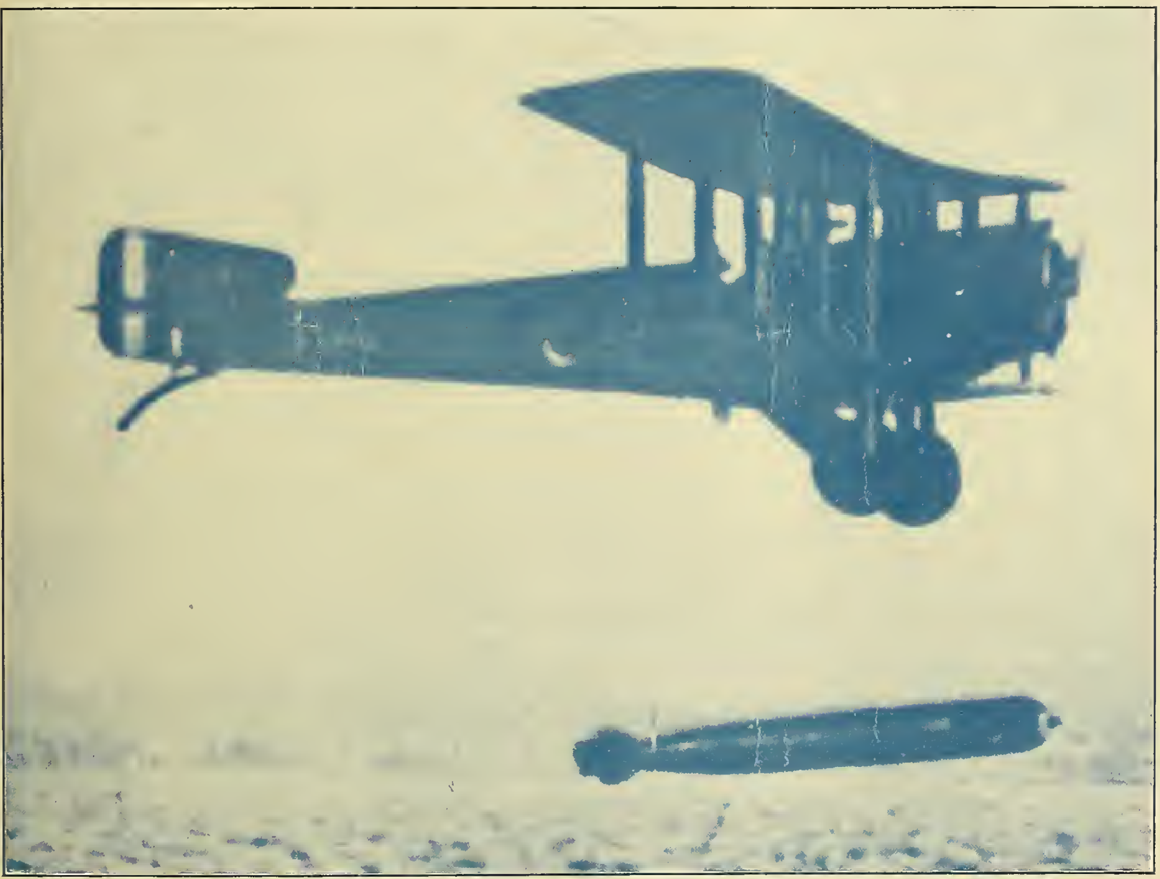

Admiral Fiske's idea being put into effect. The Sopwith torpedoplane dropping a torpedo over the North Sea

American Express Company Ready to Handle Aerial Express

The Curtiss Model K-6 and K-12 Aviation Motors Described

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Subscription: Domestic, $4. Foreign, $6. Entered as second-class matter March 25, 1915, at the Post Office at New York. under the act of March 3rd, 1879

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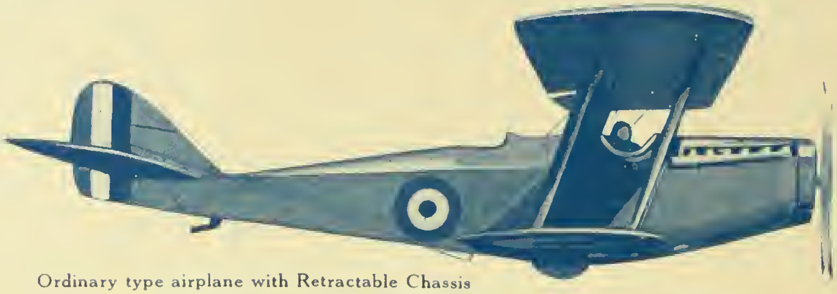
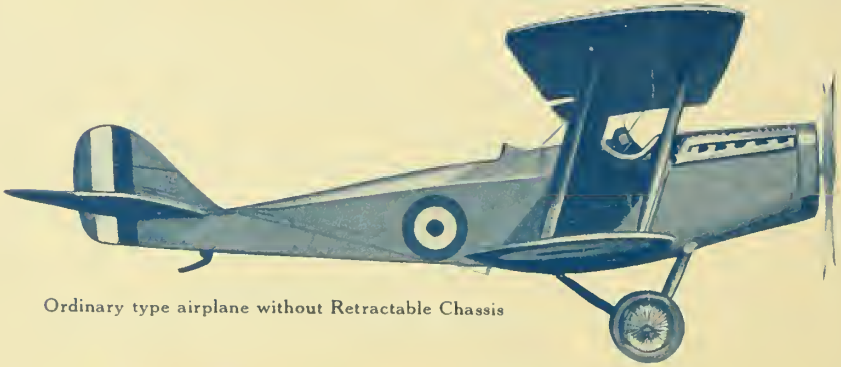


Ordinary type airplane with Retractable Chassis



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5—It should automatically close the housing recesses so that the fuselage or wing skin forms a flush surface when chassis is retracted.
6—The gage and tread of the chassis should be independent of the width of the fuselage.
7—It should utilize the forces of flight, since they are always available, for power to retract and extend and such action should be entirely automatic when released by the pilot.

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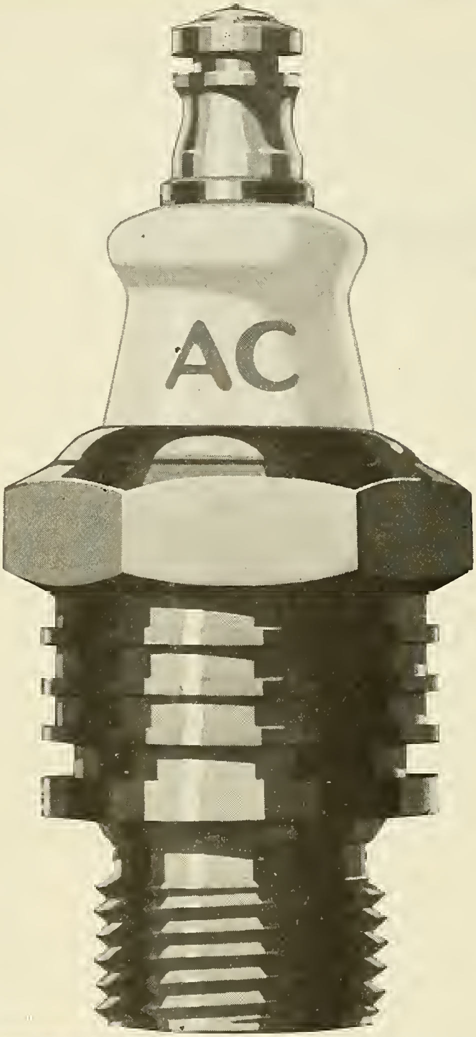

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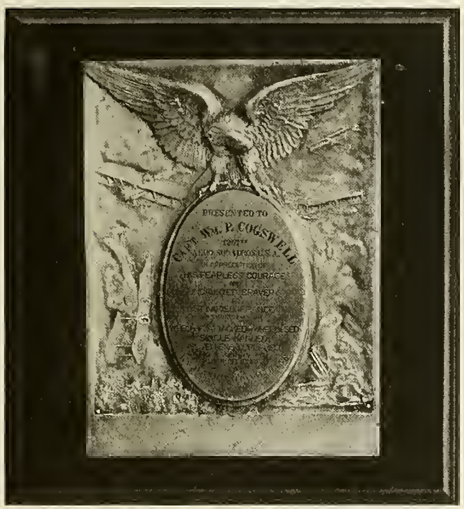

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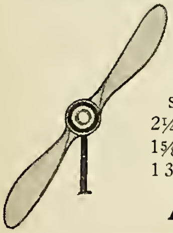

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AERIAL AGE WEEKLY

Vol. VIII FEBRUARY 3, 1919 No. 21

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VOL. VIII NEW YORK, FEBRUARY 3, 1919 NO. 21

AMERICAN EXPRESS COMPANY READY TO HANDLE AERIAL EXPRESS

MR. ALAN R. HAWLEY, the president of the Aero Club of America made public on January 28 a report of the Aerial Transportation Committee of the Club, announcing that the American Express Company is ready to handle aerial express and will do so as soon as aerial transportation lines are established throughout the country.

The American Express Company, the report states, believes that the great speed of the aeroplane makes it a valuable means of transportation, and that many people will be glad to pay extra to have their packages delivered in half or one third of the time required by other means of transportation.

It has been estimated that aerial express could be carried profitably at a charge of two dollars per pound for packages of a given size between New York and Chicago.

A twin motored aeroplane can make the New York-Chicago trip in about seven hours, without stopping, carrying over one thousands pounds of express matter.

Such an aeroplane, made to order, will cost about $20,000. In future, when they are built in large number, they will probably cost only $10,000.

The life of the motors, if run throttled down, is over 500 hours of flying. The life of the plane itself is greater.

A low compression Liberty motor burns about twenty gallons of gasolene an hour. Two Liberty motors on a plane would, therefore, consume about 280 gallons of gasolene for the New York-Chicago trip. The 300 h. p. Hispano-Suiza and the new 400 h. p. Curtiss motor, consume less gasolene than the Liberty.

It appears that it will be possible to get between four and seven miles to the gallon of gasolene in operating air lines.

Mr. Ralph E. Towle, the manager of the Travel Department of the American Express Company, has gone to Europe to investigate the plans and methods of aerial transportation in Europe. Mr. Albert R. Green, the assistant manager, is receiving the hearty co-operation of the Aerial Transportation Committee of the Club. Mr. Glenn H. Curtiss, the famous aeroplane manufacturer, who is a member of the Committee, took Mr. Green through the Curtiss aeroplane factory at Garden City to give him an opportunity to see the large aeroplanes under construction, and to see a 50-passenger air yacht.

"The action of the American Express Company is an epoch-making event in aeronautics," said Mr. Hawley.

"It will be a great inducement to the pioneer concerns that are planning to establish aerial transportation lines throughout the country to know that the American Express Company is ready to co-operate with them—and probably use the major part of the carrying capacity of their planes, no matter how large they may be."

The members of the Aerial Transportation Committee of the Aero Club of America are as follows: Rear-Admiral Robert E. Peary, Chairman; Col. Bion J. Arnold, Roger W. Babson, Sir F. W. Baillie, Major T. F. Baldwin, U. S. A., Bernard M. Baruch, Capt. R. A. Bartlett, Alexander Graham Bell, Major August Belmont, U. S. A., Laurence V. Benet, Walter Berry, Lieut. Commander P. N. L. Bellinger, U. S. N., Lieut. Commander W. Starling Burgess, U. S. N., James M. Beck, General Theodore A. Bingham, Lieut. Col. James A. Blair, Jr., William H. Bliss, Col. G. C. Brant, U. S. A., Rear Admiral Mark S. Bristol, Lieut. Col. A. R. Christie, Col. C. C. Culver, U. S. A., Lieut. Godfrey L. Cabot, U. S. N., Manuel Estrada Cabrera, President of Guatamala, Gianni M. E. Caproni, Col. Charles deF. Chandler, Edward B. Close, Alexander Smith Cochran, T. Jefferson Coolidge, J. Parke Channing, W. Redmond Cross, J. S. Cullinan, Glenn H. Curtiss, Capt. Bronson M. Cutting, Edgar B. Davis, Col. Milton F. Davis, U. S. A., H. P. Davison, James Deering, Charles Dickenson, Capt. Earl W. Dodge, Lieut. W. E. Doherty, U. S. N., Eben S. Draper, Irenee duPont, T. Coleman duPont, Brig.-Gen. Robert K. Evans, U. S. A., Rear-Admiral Bradley A. Fiske, Major Max Fleischmann, Col. A. F. Fuller, U. S. A., Major Robert Glendinning, Major Howard L. Goodhart, Major C. C. Goodrich, Major David M. Goodrich, Major Edwin Gould, Alan R. Hawley, William Hawley, John Hays Hammond, Jr., J. R. Harbeck, A. A. Harriman, Peter Cooper Hewett, Dr. A. L. Hipwell, W. S. Hogan, Lt. Col. F. L. V. Hoppin, Hon. Murray Hulbert, Col. H. B. Hersey, Prof. J. F. Haworth, Col. E. Lester Jones, Major-General W. A. Kenly, Major Fiorello H. La Guardia, Capt. B. B. Lipsner, Henry Lockhart, Jr., Capt. Pierre Lorrilard, Harold F. McCormick, Clarence H. Mackay, Emerson McMillan, Lord Northcliffe, Glenn L. Martin, Col. Archie Miller, U. S. A., Major J. C. McCoy, W. W. Miller, Harry Bowers Mingle, Wm. H. Page, Augustus Post, George W. Perkins, L. C. Phipps, Col. James Prentice, Major Cushman A. Rice, U. S. A., Prof. C. L. Poor, R. B. Price, N. G. Rost, Hon. William G. Sharp, Allan A. Ryan, Alberto Santos-Dumont, Herbert L. Satterlee, F. A. Seiberling, J. DeMont Thompson, Rodman Wanamaker, Lt. Col. Wm. Thaw, Brig. Gen. Cornelius Vanderbilt, W. K. Vanderbilt, G. Douglas Wardrop, Felix M. Warburg, Sidney B. Veit, Henry Woodhouse, Major Orville Wright, Harry Payne Whitney, John N. Willys, Evan J. David, K. M. Turner.

NEW YORK POLICE TO HAVE VOLUNTEER AERO SQUADRON

FOLLOWING a conference with Police Commissioner Enright, Special Deputy Police Commissioner Rodman Wanamaker, Inspector Dwyer, Special Deputy Police Commissioner Allan A. Ryan, Special Deputy Commissioner Wallis, Dr. John A. Hariss, Special Traffic Commissioner, and other high officials of the Police Department and the Aero Club of America officials, the chief of the Aviation Section of the New York Police Department, Colonel Jefferson De Mont Thompson, made public the plans to organize an aero squadron to be part of the New York Police Department.

Colonel Thompson also discussed the plans with Colonel William A. Bishop, the Canadian Ace, who has 72 enemy aeroplanes officially credited to him, at the Aero Club of America's reception to Colonel Bishop, and Colonel Bishop approved of the plan heartily.

Captain Arthur J. Coyle, commanding officer of the First Aero Squadron of the American Expeditionary Forces, who also was at the Aero Club of America, was enthusiastic over the plan and assured Colonel Thompson of his co-operation in organizing the Police Aero Squadron.

It has been decided that the Aviation Section of the New York Police shall be a volunteer body.

The formation will be the aero squadron formation as prescribed by the United States Government, which provides for 20 officers, including the executive, technical, medical, etc., and 12 pilots. As a rule there are 154 non-commissioned officers and enlisted men to an aero squadron. The number of officers and men per aero squadron have been changed from time to time, and in organizing the Police Aero Squadron, the Police authorities will comply with the latest United States Army formation requirements.

This will make the New York Police Aero Squadron of military value and will set the standard for police aviation sections, which other cities, no doubt, will organize in the near future.

An aero squadron consists of three aero companies. The aero company is the smallest aero tactical unit, and the Aero Club of America has suggested that smaller cities begin by organizing an aero company. Larger cities will be urged to organize aero companies.

Leading New York aces will be invited to join the Aero Squadron of the New York Police. Colonel Thompson stated today that he was asking the following American Aces, who are residents of New York, to join the New York Police Aero Squadron:

Captain Edward V. Rickenbacker, the foremost automobile driver, who is the premier ace of the American Air Forces, having 26 enemy planes to his credit.

Lieut. Col. William Thaw, the dean of American Aviators, who has 5 enemy planes to his credit.

Major James A. Meissner, who has 8 enemy planes to his credit.

Major Cushman A. Rice, who commanded 4 American Aero Squadrons which co-operated with the British forces and who was wounded and gassed at the second Somme battle.

1st Lieut. Lansing C. Holden, who has 7 enemy planes to his credit.

2nd Lieut. Howard Brodick, of Brooklyn, who has 6 enemy planes to his credit.

Lieut. F. M. Symonds, who has 5 enemy planes to his credit.

Three other aces—Lieut. E. P. Curtis, of Rochester, New York, who has 6 enemy planes to his credit; Lieut. E. M. Haight, of Astoria, New York, who has 5 enemy planes to his credit; and Lieut. H. H. George, of Niagara Falls, New York, who has 5 enemy planes to his credit, will be asked to join the New York Police Aero Squadron, if their respective cities do not need their services.

Colonel Thompson attended the reception given by the Aero Club of America to Colonel Bishop, the Canadian Ace, who has been credited officially with 72 enemy planes, and discussed the plan of the New York Police Aero Squadron with Colonel Bishop and the Aero Club of America officials.

Colonel Bishop was greatly interested in the project, which he approves heartily.

Colonel Bishop stated that the example of New York City will, no doubt, be followed by every progressive city in the world in the very near future.

AWAITING THE AERIAL LIMITED

AMERICA is falling behind England in aerial passenger transportation. Already two British companies are regularly operating air lines between London and Paris, carrying people for £15 a passenger each way and on schedule time, making the round trip between breakfast and dinner and allowing four hours in either city for transacting business. An aerial express is also flying a London-Manchester-Liverpool route. Another British company has sent out a bi-motored biplane with six civilians from London to Delhi, India, via Brindisi, Marseilles, Otranto, Cairo, Damascus, Bagdad, Bushire, Bandar Abbas and Karachi—a total distance of nearly 4,000 miles. Major General Salmon, in a bi-motored military machine of the same type, has already flown 3,950 miles from Cairo to Calcutta. This same biplane had previously negotiated the flight all the way from London to Cairo and had done extensive bombing of the Turks in Palestine.

In the United States only two aerial transportation companies have displayed any life. There are no machines in regular passenger service on schedule from city to city.

With regular aerodromes—even one hundred miles apart—passengers can be carried in standardized, bi-motored aeroplanes safely and on schedule time. If one motor stalls the other has sufficient power to fly the aircraft to its destination, with no greater loss of time than characterizes regular, long-distance train service in this country. Comfort against the cold is provided by electrically heated clothing, and, of course, no kind of earth travel compares with flying for breadth of view and exhilaration.

The greatest present need for popularizing American aeronautics is for the manufacturers of aircraft to put into operation at once a passenger-carrying air line and to transport passengers through the heavens from one city to another safely and on schedule time. This can easily be done by three or four types of bi-motored aeroplanes now completed in this country. 'Buses aerially navigating the distance between New York and Washington, via Philadelphia and Baltimore, could be put into operation any day, starting from Belmont Park and landing at the same aerodromes as the aero mail ships now use. Indeed, the aero mail between this city and the capital has already made an enviable record of 350 consecutive flights through all kinds of weather—from thunder to snow storms—with only three delays.

The Manufacturers' Aircraft Association is, perhaps, the most logical organization to start such an enterprise at once. Several of its members have constructed bi-motored aeroplanes which could carry a score of passengers between those four cities without danger and in great comfort. So many people are anxious to visit cloudland in a heavier,than-air machine that the line would soon pay for itself. By doing this they would greatly advance the glory of American aeronautics.—Editorial in the N. Y. *Tribune*.

THE NEWS OF THE WEEK

Senator Chamberlain Calls for Department of the Air

Washington, January 22nd.—Senator Chamberlain sounded a call for aerial preparedness for the next war before the Senate Military Committee. As a necessary foundation for a strong aeronautic policy Senator Chamberlain urged the establishment of a Department of the Air, with its head a Cabinet Member. The Senator said:

"The United States should profit by the experiences of the war with Germany and formulate a constructive programme accordingly. We ought to continue to manufacture aeroplanes in reasonable quantities, but more than all we should endeavor to develop mechanical flight so as to be able, should the emergency arise, to achieve and maintain control of the air.

"I do not think that this country should endeavor to keep up an air programme to the extent aimed at while we were at war, but developments in aeronautics more than in all other sciences bearing on intimate relationship to national defence is absolutely essential. Otherwise America cannot hope to attain that position of supremacy in aerial navigation which she should have attained during the war had our executive efforts been properly co-ordinated.

"The air problem in the future seems to rest on efficient co-ordination. It is for this reason that we—speaking for a majority of the members of the Senate Military Affairs Committee—recommend a unification of effort, and still urge such a policy. What I would like to see would be the creation of a separate air bureau or department, whose head shall sit in the Cabinet along with the Secretaries of War and Navy."

War Department Permits Publicity On War Contracts

Washington, January 19th.—According to an official statement issued by the Director of Purchase, Storage and Traffic, War Department, the revocation of the clause or clauses in War Department contracts, prohibiting the publication of information in respect to such contracts, having been approved by the Secretary of War, the provisions of such prohibitory clauses are revoked. Contractors are, therefore, authorized and permitted to furnish the public information concerning War Department contracts and orders received by them.

"Aeronautical Day" At Brooklyn Rotary Club

Brooklyn, N. Y., January 22nd.—Among the notables of Aeronautics who attended the luncheon meeting of the Brooklyn Rotary Club at Hotel Bossert was Mr. Alan R. Hawley, President of the Aero Club of America; Mr.. Augustus Post, Secretary of the Aerial League of America; Mr. Charles Jerome Edwards, Vice-President of the Aero Club of America and President of the Rotary Club; Captain Robert A. Bartlett, Captain of the S. S. *Theodore Roosevelt* when Admiral Peary discovered the North Pole, and who is planning a flight to the North Pole next summer.

Speaking of the projected aero flight to the Pole, Capt. Bartlett said: "People ask what is the use of making these explorations, but if the British Government had sat down and not explored the world the British flag would not today be flying from every quarter of the globe, and if we do not explore these white spots on the map and draw some lines in them some other nation will."

Department of Military Aeronautics Disposing of Surplus Material By Auction and Sealed Bids

New York, January 23rd.—The Aero Club of America has recently received a communication from the Department of Military Aeronautics requesting that attention be called to public auctions and sale under sealed bids of practically every item used on a flying field.

Communications requesting information on this subject should be addressed to Lieutenant H. G. Quirt, Supply Station, Salvage Branch, Department of Military Aeronautics, Washington, D. C.

Officers Can Collect Back Flying Pay

Washington, D. C., January 23rd.—According to reliable information, officers commissioned since July 1st, 1918, can collect 50% increase in pay for all the time they have been on flying duty as enlisted men since July 1, 1918. The procedure to be followed in obtaining back flying pay is to write to the Commanding Officer of the field at which training was received and request an order placing them on flying status on July 1st and taking them off on the date of this commission. This order, together with a statement of claim due, should be sent to the Auditor, War Department, Washington, D. C.

Flies 9 Hours 21 Minutes

Miami, Fla.—What is said to be a new aerial endurance record was established on January 23 by Ensign F. Dalrymple, of the local air naval station, who remained in the air continuously for nine hours and twenty-one minutes.

Driving a HF-2 machine and accompanied by a mechanic, Dalrymple left the air station here at 8:10 a.m. and remained in the air until 5:31 p.m., he made two trips to Key West and back before landing. The previous endurance record, it is said is for nine hours and one minute.

The machine used on the flight was specially constructed and equipped with a Liberty motor.

Col. Bishop Predicts Many Commercial Uses for Aeroplanes

New York, Jan. 25.—At a luncheon given in honor of returning war aviators by the Aero Club of America, Col. William A. Bishop, Canadian "ace," with seventy-two German planes to his credit, predicted confidently that both giant and one-engine planes will be making transatlantic flights within six months.

"Eight British firms are building planes to fly across the ocean," said Col. Bishop. "The Vickers Company will soon put out a machine of unprecedented size for that flight, but, for my part, I think the trip can be made in a single-engine plane. Such small machines are making regular trips between Montreal and Toronto.

"Three firms will have aerial garages in Canada within a year. Then one may call up a garage, a plane will call for him and he will be off on the fastest and most delightful journey he ever made. These machines will carry freight too.

"To encourage the building of planes for commercial purposes, laws governing aerial traffic must be made and obeyed," Col. Bishop went on. "There must be rules of the air, just as there are rules of the road. And the customs officers will have to be on the sharp lookout for aerial smugglers.

"In British Columbia aeroplanes are being used most successfully to detect forest fires and prevent their spread. The aviator either flies and gives the alarm in person or drops especially prepared chemical bombs. All Canada will adopt this system to protect her valuable forests, I think."

John Burroughs, the perennial naturalist, asked the Colonel if he would take him on a transatlantic air voyage. Col. Bishop smilingly promised that he would.

Aero Exposition Plans Maturing

New York, Jan. 27.—Owing to the large number of exhibits offered, the Manufacturers Aircraft Association has found it necessary to lease for its Annual Aeronautical Exposition not only Madison Square Garden but the 69th Regiment Armory as well. It was at first planned to hold the exposition late in February, but developments in co-operation with the Government made advisable a slight change in dates. As a result the

The Aero Club of America reception to Lieut. Col. William A. Bishop, R. A. F. and Captain Arthur J. Coyle, Commander First Aero Squadron, American Air Force. From left to right: Henry Woodhouse, Captain Arthur J. Coyle, U. S. A.; Colonel Bishop, R. A. F. (in civilian clothes); Rear Admiral Bradley A. Fiske, U. S. N.; Captain Roger B. Whitman, U. S. A.; Lieut. Horace B. Wells, Augustus Post, members of the U. S. Army and Navy Air Service; William Hawley, Lieut. Eytinge, Canadian Air Service; Lieut. W. D. Adams, and Lieut. Edwin C. Moore. About 200 people were present, including Robert A. Bartlett, famous explorer; John Burroughs, the famous naturalist; Dr. Terry, Mr. A. J. Marcuss, Mr. M. M. Marcuss, Major H. A. Bubb, Lieut. H. S. Koch, Lieut. James Crommery, Colonel J. DeMont Thompson, Robert Graves, Henry A. Wise Wood, Mr. J. C. Cullinan, Lieut. M. Gilbert Whitman, Lieut. DeWilder Atkinson, R. A. F.; Lieut. Nelson, A. S. A.; Lieut. N. W. Siberman, Lieut. K. M. Murray, G. Douglas Wardrop, managing editor of Aerial Age; Dr. C. A. Lawrence, Mr. E. A. Townley, Lieut. Beckwith Havens, U. S. N.; Evan J. David, business manager of Flying; Leroy B. Gulotta, editor of Air Power; Major Cushman A. Rice, etc.

exposition will be held from March 1 to March 15.

Arrangements for the exposition have brought the Show Committee of the Association into communication with an extensive range of industries. The exhibitors, it is predicted, will include not only the aeroplane and motor manufacturers but the makers of parts, accessories and subsidiary elements that enter into the construction of this most modern product of science and industry—the flying machine.

The members of the Manufacturers Aircraft Association are completing their show plans as rapidly as possible and the principal companies have already made definite plans for space, exhibits and the manner of display. It is planned to have all aeroplanes where they may be seen close at hand. In the case of the Army and Navy it is understood that soldiers and sailors trained in flying, gunnery or mechanics will be stationed at the various exhibits to explain to the people what each part means and how it functions.

It is not the aim to segregate the commercial, naval and military exhibits, but to distribute them throughout both the Garden and the armory. Visitors will have an opportunity to see not only the products of American aircraft industry but will be able to see examples of commercial and military construction from Great Britain, France and Italy. War trophies, of course, will represent Germany.

The Performance of the Christmas Bullet

In the description given of the Christmas Bullet in Aerial Age on January 20, the ceiling of the machine was given as 14,700 feet. This reference was to the climbing efficiency of the machine, and not the actual ceiling. The actual ceiling has been computed to be close to 34,700 feet.

The climbing efficiency is 1,700 feet per minute; that is to say, the machine is capable of climbing 1,700 feet per minute until an altitude of 14,700 feet is reached, from which point, the climbing rate naturally decreases until the actual ceiling has been reached.

National Special Aid Society to Aid Bartlett Air Polar Trip

Women are to have their part in the Roosevelt Memorial Arctic Expedition which is to start by aeroplane for the polar regions in June of this year. The Aviation Committee of the National Special Aid Society, Mrs. William Allen Bartlett, chairman, has just voted to contribute the complete hospital equipment and supplies for the expedition. This expedition will be financed by the Aerial League of America and be in charge of Captain Robert A. Bartlett, who was Captain of the S. S. *Roosevelt* in both of the Peary expeditions, and Commander of the McMillan Relief Expedition, etc.

The funds for this donation will come from the Treasurer and Trinket Fund of the society, which, working for the aviators of the United States Army, has raised nearly $100,000 to supply them with warm garments and other necessities and to aid their dependents in case of disaster. The women voted unanimously to make this gift to the expedition; it will be arranged with expert medical and surgical advice, and they may increase the gift when the cost of the equipment is learned.

Dirigible Made 1,200 Miles in 29½ Hours

D. G. Caywood, special field representative of the Black & Decker Co., of Baltimore, manufacturers of precision apparatus

The big navy dirigible, C-1, which recently sailed from Rockaway to Key West, covered the 1,200 miles in twenty-nine and on-half hours actual time in the air, according to its commander, Capt. Stanley V. Parker, who reported to Washington yesterday. He came back on a train, which required sixty hours.

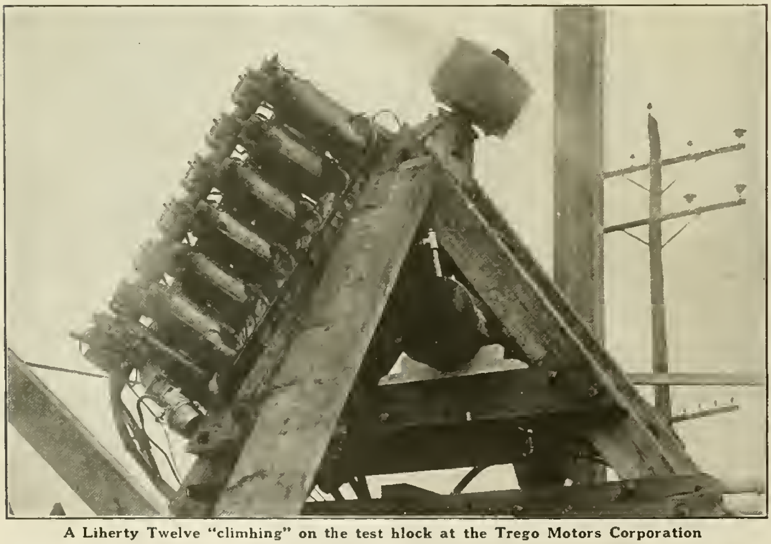
Two other remarkable endurance flights by the Navy Dirigible A-236 from the naval air station at Key West, one lasting 32 hours and covering 750 miles, and the other 40 hours and 48 minutes, and covering about 850 miles, constituting a service record, were described in official reports made public recently.

Rising winds and threatening storm stopped the first flight November 24, although sufficient fuel and oil remained for 8 more hours. During the first 10 hours the ship was lightened 300 lb. by consumption of gasoline. Her crew brought her down to within 50 ft. of the sea and with buckets and line took up enough water to restore her propeller balance.

The second trip, made December 24-25, was made under overcast skies with a wind ranging from 20 to 36 miles an hour. The propelling motor was stopped only twice, for 3 minutes each time, to fill the oil reservoir.

Army Reorganization Bill Provides for Reduced Air Service

Washington.—Indications of the size of the future Air Service of the Army is given in a proposed bill drawn up by the War Department this week. The bill, which will probably be held in abeyance pending possible developments in Europe, calls for an Air Service of 1,923 officers and 21,853 enlisted men. The officers include one major general, one brigadier general, twenty-two coloniels, forty-five lieutenant-colonels, 126 majors, 438 captains, 696 first lieutenants and 594 second lieutenants. An organization of this size would require approximately 2,000 aeroplanes in constant service.



A Liberty Twelve "climbing" on the test block at the Trego Motors Corporation

New Air Service Insignia

Washington.—An insignia for fliers has been approved with certain changes as follows: (a) Military aviators, junior military aviators and reserve military aviators: a device of oxidized silver consisting of a pair of wings with the shield between; to measure 3 in. from tip to tip.

(b) Military aeronaut, junior military aeronaut and reserve military aeronaut: a device of oxidized silver consisting of a pair of wings with a balloon between; to measure 3⅛ in. from tip to tip.

(c) Observer: an oxidized silver single wing to the left of the letter "O" in bright silver; the "O" to encircle the letters "US" in oxidized silver in relief on an oxidized silver background; the device to measure 1⅞ in. in length.

Flying instructors: gilt insignia of the same design and size as the insignia for officers of the Air Service, omitting the propeller; to be worn just above the right cuff on all coats.

Conditions for Tests of Experimental Aeroplanes Announced

The following regulations were authorized by General Kenly, January 14, 1919:

1. The Chief of the Technical Section is charged with the responsibility for all tests of experimental aeroplanes at Air Service Fields.

2. Requests by private enterprise for permission to conduct *Unofficial Tests* of experimental aeroplanes at Air Service Fields may be granted under the following conditions:

(a) Such tests will be conducted at McCook Field, Dayton, Ohio, unless otherwise permitted by the Director of Military Aeronautics.

(b) Such tests will be entirely at the owner's risk and expense and he shall supply the pilot therefor. No Air Service pilot will be permitted to engage in these tests.

(c) Flight tests will be permitted only after a technical examination by a representative of the Technical Section. If, in the opinion of this officer, the aeroplane is unsafe to fly, no flight will be permitted at an Air Service Field.

3. *Official Tests* of experimental planes will be authorized only at McCook Field, Dayton, Ohio, and under the following conditions:

(a) The owners of such aeroplanes must submit two models—one for destruction test and one for performance test.

(b) Tests will be at Government expense and the flight test will be made by an Army pilot detailed by the Chief of the Technical Section.

(c) Flight tests will be permitted only after a technical examination and sand-test by a representative of the Technical Section. If, in the opinion of this officer, the aeroplane is unsafe to fly, no flight will be permitted at an Air Service Field.

4. Pilots inexperienced in flying experimental aeroplanes will not be permitted to fly such planes until after they have been placed "in production."

5. Commanding Officers at Flying Fields will be held strictly responsible that no flights are made at their fields in violation of the foregoing instructions.

1,000,000 Ship Tons Saved by Efficient Aeroplane Packing

The studies carried on by Bureau of Industrial Research recount a saving of space in aeroplane shipment as follows.

The studies which were made in reduction of space necessary in which to ship aeroplanes resulted in the cutting of the size of the boxes needed for a single machine 50 per cent. This would mean that with limited transportation facilities double this number of planes could be shipped in a single trip across the ocean. In one instance alone 50 carloads of freight were so repacked as to require the space of only 15 with its proportionate saving in cargo space.

To the work of the Bureau of Industrial Research of the Purchase, Storage and Traffic Division is due the conservation of space in thousands of freight cars and at least a million ship tons. Credit is also due the bureau for reduction in losses due to faulty and defective packing. As a result of the efforts of its experts, millions of dollars were saved in packing materials and many more millions of invaluable tonnage and cargo space for the use of the Army.

Pioneer Military Air Heroes' Photos Sought

The Director of Military Aeronautics desires to have photographs of the officers named below, who were killed in aeroplane accidents, and for whom fields of the Air Service have been named. So far it has been impossible to get in touch with any relatives or friends of these men, all of whom died several years ago and whose records in the War Department are incomplete: Lieut. Moss L. Love (Cavalry), Lieut. Joseph D. Park (Cavalry), Lieut. Lewis C. Rockwell (Infantry), Lieut. Lewis W. Hazelhurst, Jr. (Signal Corps), and Lieut. Eric L. Ellington (Cavalry).

The AIRCRAFT TRADE REVIEW

A. E. J.

Packard Motor Co. to Market Two Passenger Biplane

Detroit.—The Packard Motor Car Co. is shortly to place on the market a two-seated biplane which is to be sold through Packard dealers at a figure close to $15,000. The Packard Company, therefore, becomes the first manufacturers of passenger cars and trucks to take up, in a commercial way, the production of aeroplanes for general use.

The decision of the company to enter this new field is not altogethr surprising in view of its experience in the development of an aeroplane engine of its own and of the intimate relationship betwen the Packard engineering force and the finished Liberty engine. It was largely through the efforts of Jesse G. Vincent, at that time vice-president of engineering of the Packard Company, that the Liberty engine was designed and brought to perfection.

Beyond the fact that the machine is to be a two-seated biplane, little regarding the design and construction has been permitted to become public. It is expected, according to "Automotive Industries," that the first machine will be ready in from thirty to sixty days, and it is planned to supply them to dealers as rapidly as possible. Already the Chicago dealer has ordered one and other dealer organizations see in the machine a potential market composed of well-to-do sportsmen.

That dealers will take readily to the sale of planes, and that they believe in the possibilities of selling such machines is indicated by the fact that in both Milwaukee and Philadelphia, dealers have recently arranged to handle aircraft. George W. Browne, Milwaukee distributer of Overlands, is to take on the distribution of Curtiss machines, which are made by the Overland interests; and in Philadelphia, Isenberg Brothers have prepared plans and shortly will erect a building to be used for the exhibition and sale of heavier-than-air machines. The company will sell both new and used machines.

U. S. Naval Aircraft Production

Washington, Jan. 20.—The U. S. Naval Aircraft factory at Philadelphia produced aircraft valued at $5,435,000 up to the time the armistice was signed, according to an announcement made recently. It had completed, ready for shipment, 183 twin-engine flying boats at an average cost of $25,000. It had also produced 4 experimental Liberty engine seaplanes carrying the Davis non-recoil gun, at a cost of $40,000 each, and 50 sets of twin-engine flying boat spare parts worth $10,000 per set. In addition, considerable minor experimental work and overhauling of machines from other stations was done.

Bosch Magneto Company Officially Becomes American Bosch Magneto Corporation

On December 7th, 1918, the Alien Property Custodian of the United States sold the entire property holdings, assets and patent rights of the Bosch Magneto Company to the highest bidder. The organization papers, drawn up for inspection as to the Simon Pure Americanism of the purchasers, reveal some interesting facts in connection with the successors, the American Bosch Magneto Corporation.

The Officers of the new company are: A. T. Murray, President; George A. MacDonald, Vice-President and Treasurer; A. H. D. Altree, Vice-President; Leon W. Rosenthal, Vice-President; J. A. MacMartin, Secretary and Assistant Treasurer. The Directors are: A. T. Murray, H. C. Dodge, Martin E. Kern, Duncan C. Holmes, George A. MacDonald, Philip L. Spalding, Henry N. Sweet, H. B. Benedict, C. H. Dwinnell.

Mr. Murray, President and Director of the new company, is also President of the Bethlehem Motors Corporation, of Allentown, Pa. Besides managing the Magneto Corporation, Mr. Murray will continue as the active head of the Motors Corporation.

Mr. MacDonald, Vice-President and Treasurer of the new company, is also President of the Chicopee National Bank, Springfield, Mass.

Mr. Kern is President of the Penn Counties Trust Company, Allentown, Pa., and is also Treasurer of the Bethlehem Motors Corporation.

Messrs. Sweet and Benedict are connected with Hornblower & Weeks, Bankers, of Boston and New York.

Mr. Dwinnell is Vice-President of the First National Bank of Boston, and Mr. Holmes is Vice-President of the Chase Securities Corporation, New York. Mr. Dodge is Chairman of the Board of Directors of the Gray & Davis Company, of Boston, and President of the H. A. Wood Company, also of Boston. Mr. Spalding is President of the New England Telephone and Telegraph Company, Boston, Mass.

The American Bosch Magneto Corporation has taken over the entire holdings and organization of the old company, including the great Bosch Works at Springfield, Mass., which comprises 250,000 sq. ft. in buildings alone and employs 1,500 operatives; also the complete service and selling system throughout the United States, and the entire ownership of all the United States and foreign patents and trade marks under which the old company operated. Ever since the Alien Property Custodian seized the company in May of 1918, the large plant was operated to supply, up to practically 100% of its capacity, the needs of various Departments of the United States Government in the prosecution of the war. That large output will now be devoted without interruption to the requirements of the American manufacturers and public. In addition, the American Bosch Magneto Corporation plans to greatly extend its scope of manufacture in the field of automotive industry.

From an early date, the Bosch Magneto Company manufactured electrical products of unusually high quality for the automobile and allied fields, including ignition devices such as Magnetos and Battery Systems, Lighting Generators, etc. In fact, the first Bosch Magneto dates back to 1886, although this form of ignition was not adopted by American manufacturers of automobiles until 1905. In the following year, Robert Bosch opened a New York office, and in 1908 a four-story building was acquired to meet the demands of the products then made. It is said that about 350 workmen produced eight to ten thousand magnetos a month at that time. The next important step in the growth of the Bosch Magneto Company, the title under which the German concern operated in the United States, was taken in 1911, when ground was broken in Springfield, Mass., for what is now recognized as the most modern and well-ordered factory in the motor industry.

In January, 1912, the extensive Springfield Works were completed, only to be found too small by 1914, when more than one-quarter of a million magnetos were turned out. Accordingly, the Rushmore Dynamo Works was purchased to increase the production of Starting and Lighting apparatus. Expansion still continued. Early in the fall of 1915, ground was again broken at Springfield for an addition of over 60,000 sq. ft. to the main works. The American Corporation now has in its possession all of these excellent buildings and their equipment, together with a recreation park and club house for the employees, across the street from the main factory. It is also the exclusive owner of more than 150 United States patents and a large number of United States patent applications, together with numerous foreign patents and applications. Also the well known Spark-Devil and other Bosch trade marks registered throughout the world belongs to it.

It is understood that the new organization intends to engage actively in establishing itself in a position of even greater prominence in the production of electrical apparatus for American automotive fields than the old company enjoyed before the war.

Ban On Civilian Flying Lifted

Washington, D. C., January 23rd.—According to an official announcement from the War Department, the Joint Army and Navy Board has removed restrictions on civilian flying and will issue permits upon application to all qualified civilians who have been denied the right to fly under the President's Proclamation of February 28, 1918.

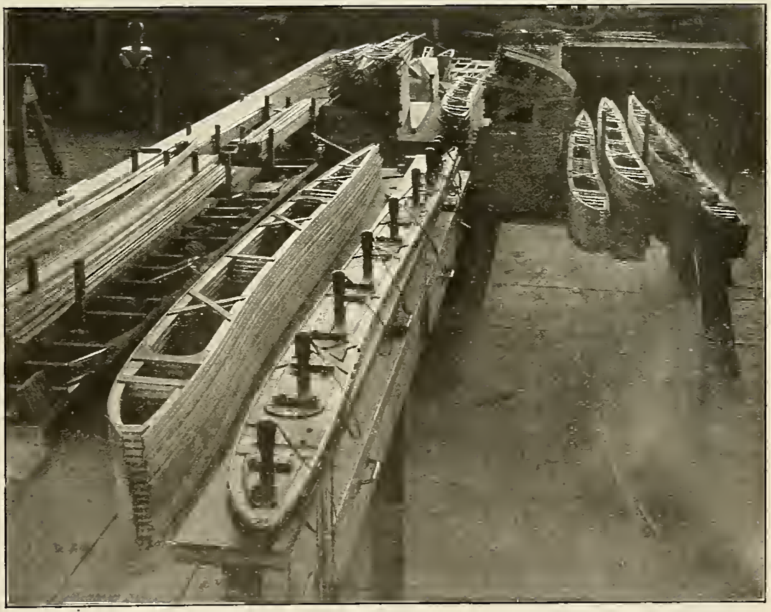
Applications for permits should be addressed to the Joint Army and Navy Board on Aeronautic Cognizance, Building "D", 6th and B Streets, N. W., Washington, D. C. Attention of Lieut. L. G. Haugen.

In making an application for a flying license the civilian is requested to forward a copy of his or her certificate or license showing that the individual is qualified as a pilot.

The application must be supplemented with full information as to the nature of the aerial project contemplated; the financial backing; the means to be taken to insure the reliability of motors and the upkeep of planes; types and condition of planes, and the number of hours each has been flown. The number of mechanics to be employed should also be stated.

In short a complete detailed report is desired, and standard forms of application are furnished upon request to the Secretary, Lieut. L. G. Haugen, Division of Military Aeronautics.

It is anticipated that the lifting of this ban will result in the re-opening of various flying schools and increased activity on the part of manufacturers.



The jig for rib construction used by the Glenn L. Martin Company, of Cleveland

Hon. Albert S. Burleson, Postmaster General
Hon. Otto Praeger, Second Assistant Postmaster General
J. B. Corridon, Superintendent, Division of Aerial Mail Service

Louis T. Bussler, Chief of Maintenance and Equipment
J. Clark Edgerton, Chief of Flying Operations
George L. Conner, Chief Clerk, Division of Aerial Mail Service

US
AERIAL MAIL

PILOTS

Ira O. Biffle
Dana C. DeHart
Edward V. Gardner
Lawton V. Smith
Leon D. Smith
Robert F. Shank
Irving Graeh

John A. Jordan, Superintendent, Western Division
Trent C. Fry, Manager, Belmont Park, L. I.
Charles I. Stanton, Manager, College Park, Md.
John M. Miller, Manager, Bustleton, Pa.
O. J. Sproul, Manager, Chicago, Ill.
C. E. McMillan, Manager, Cleveland, Ohio
August Carlson, Manager, Lehighton, Pa.
Harry F. Powers, Manager, Bellefonte, Pa.
William Lindley, Manager, Clarion, Pa.
J. P. Edwards, Manager, Bryan, Ohio
Charles N. Kight, Special Representative

RESERVE PILOTS

Lester F. Bishop
Dan Davison
C. C. Eversole
E. A. Johnson
D. I. Lamb
Frank McCusker
E. H. Lee
Lyman Doty

CHIEF MECHANICS

Frank Tower
Edward C. Radel
Chas. C. King
H. E. Fremming
Albert Cryder

London-Buenos Aires Airship Trip Planned

London—Sir Woodman Burbridge announces that he has booked passage from London to Buenos Aires aboard the airship which it is proposed shall undertake the trip next August. He says the preparations are being made by the Vickers interests, and it is expected that the voyage will not take more than six days.

Sir Woodman is going to Buenos Aires on business, and considers that the saving of fourteen days on the journey will be worth the increase in fare, which he understands will be between $2,000 and $2,500 for one way. Aerial mail will be carried at special rates, and will be able to compete with cable communication in cheapness but in speed of transmission.

He will take his wife with him, and he believes that there will be other women passengers. The total number of passengers, he says, will be about fifteen.

As at present arranged there will be two stopping places—one in Spain and one in Brazil.

Postmarks On Air Mail

OFFICE FIRST ASSISTANT
POSTMASTER GENERAL,
Washington, January 17, 1919.

It has been brought to the attention of the department that many postmasters use ordinary rubber hand stamps and various colored inks in postmarking mail received for dispatch by Aeroplane Service. This practice will be discontinued immediately, and all aeroplane mail will be postmarked and the stamps thereon canceled by the use of canceling machines or the regular hand postmarking stamps, and the black canceling ink furnished by the department for such purpose.

J. C. KOONS,
First Assistant Postmaster General.

Second Assistant Postmaster Otto Praeger, in charge of the Aero Mail, who is doing excellent work in the development of this service

More R. M. A.'s

The following officers have been rated as Reserve Military Aviators: 1st Lieut. Carl B. Fry, A. S. A.; 2nd Lieut. William E. Vogelback, A. S. A.; 2nd Lieut. Frederick H. Winston, A. S. A.; 2nd Lieut. Francis J. Winter, A. S. A.; 2nd Lieut. Claude R. Conklin, A. S. (M. A.); 2nd Lieut. Douglas M. Fraser, A. S. (M. A.); 2nd Lieut. Francis Jordan Winter, A. S. (M. A.); 2nd Lieut. Walter Lee Isom, A. S. (M. A.); 2nd Lieut. J. O. Stoddart, A. S. (M. A.); Captain Sylvanus C. Coon, A. S. A.; 1st Lieut. Adam Truello, A. S. A.; 2nd Lieut. Marston Campbell, Jr., A. S. A.

Air Service Units En Route Home

The Battleship New Jersey sailed from Brest January 15th and is due at Newport News January 27th, with the following troops: 480th Aero Squadron, Camp Meade, 4 officers, 152 men; 481st Aero Squadron, Ft. Slocum, 3 officers, 154 men.

The Cruiser Frederick sailed from Brest January 17th and is due at New York January 29th with the following troops: 466th Aero Squadron, Regular Army, 4 officers, 153 men; 492nd Aero Squadron, Camp Meade, 2 officers, 152 men.

The Battleship Connecticut sailed from Brest January 20th and is due at Newport News February 1st with the following troops: 162nd Aero Squadron, Camp Meade, 2 officers, 148 men; 490th Aero Squadron, Camp Meade, 4 officers, 151 men.

Following organizations have been assigned to early convoy: 90th Aero Squadron, 24 officers, 148 men; 104th Aero Squadron, 10 officers, 176 men; 17th Balloon Co., 9 officers, 174 men; 18th Balloon Co., 8 officers, 174 men; 11th Aero Squadron, 20th Aero Squadron, 161st Aero Squadron, 169th Aero Squadron, 248th Aero Squadron, 655th Aero Squadron, 656th Aero Squadron, 487th Aero Squadron, 494th Aero Squadron, and Air Service Casual Co. No. 3.

UNITED STATES POST OFFICE AIR MAIL SERVICE

Monthly Report of Operation and Maintenance

NOVEMBER 1918

													SERVICE AND UNIT COST						
Aeroplane No.	Gasoline	Grease and Oil	Office Force	Motorcycles. Trucks	Rent. Light. Fuel. Power. Telephone. and Water	Miscellaneous	Pilots	Mechanics and Helpers	Repairs and Accessories	Interest on Investment	Departmental Overhead Charge	TOTAL	Gallon of Gasoline	Total Time Run hr.	min.	Total Miles Run	Miles Run Per Gallon of Gasoline	Cost per Hour	Cost per Mile
1	$75.60	$14.27	$40.58	$28.37	$33.41	$97.29	$125.90	$149.11	$50.75	$74.78	$83.23	$773.29	258	16	07	1504	5.82	$47.98	$.5141
2	62.32	7.83	40.58	28.37	33.41	97.29	98.50	188.00	90.11	74.78	83.23	804.42	204	12	35	992	4.86	63.92	.8109
3	9.15	.81	9.09	28.37	33.41	97.29	13.68	1.70	.35	74.78	83.23	351.86	30	1	45	128	4.26	201.06	2.7488
4	89.94	19.02	40.58	28.37	33.41	97.29	141.53	187.02	7.20	74.78	83.22	802.36	296	18	07	1308	4.41	44.29	.6134
5	111.78	24.40	40.58	28.37	33.42	97.29	206.76	174.88	236.50	74.78	83.22	1111.98	400	26	28	1796	4.49	42.01	.6191
6	88.02	21.41	40.58	28.37	33.42	97.29	149.21	214.22	63.05	74.78	83.22	893.57	289	19	06	1616	5.59	46.78	.5529
38262	50.02	8.67	40.58	28.36	33.42	97.29	106.24	151.20	6.86	74.78	83.22	680.64	164	13	36	860	5.24	50.05	.7914
38274	97.70	21.18	40.58	28.36	33.42	97.29	225.12	166.39	265.10	74.78	83.22	1133.14	321	28	49	2047	6.37	39.32	.5535
38275	80.77	16.47	40.58	28.36	33.42	97.29	153.38	157.65	63.78	74.78	83.22	829.70	265	19	38	1384	5.22	42.26	.5994
38278	124.97	19.51	40.58	28.36	33.42	97.29	219.13	184.59	18.55	74.78	83.22	924.40	411	28	03	2034	4.94	32.95	.4544
39362	6.10	......	20.38	28.36	33.42	97.29	......	94.35	4.50	74.79	83.22	442.41	......	......		......	......	......	......
39363	9.15	......	20.38	28.36	33.42	97.29	......	94.35	5.50	74.79	83.22	446.46	......	......		......	......	......	......
39364	......	......	20.38	28.36	33.42	97.29	......	94.35	1.20	74.79	83.22	433.01	......	......		......	......	......	......
39365	21.35	5.21	20.38	28.36	33.42	97.29	......	94.35	2.95	74.79	83.22	461.32	......	......		......	......	......	......
14872	......	......	9.09	28.36	33.42	97.29	......	255.75	3.20	74.79	83.22	585.12	......	......		......	......	......	......
Totals	$826.87	$158.78	$464.92	$425.46	$501.26	$1459.35	$1439.45	$2207.91	$819.60	$1121.75	$1248.33	$10673.68	2638	184	14	13689	5.18	$57.93	$.7797

Cost per mile, overhead, $.2746; cost per mile, flying, $.1771; cost per mile, maintenance, $.4007.

OTTO PRAEGER, Second Assistant Postmaster General.

Instruments and knowledge of how to use them are absolutely necessary to success in cross-country flying

INSTRUMENTS FOR CROSS COUNTRY FLYING

By T. A. MORGAN, Sperry Gyroscope Co.

THE first essential for a long cross country flight such as is now being attempted by the Mail Service is an accurate compass. Such an instrument has been developed for the U. S. Navy and is known as the Navy Standard No. 1 Aircraft Compass. Quantities of these are available at the present moment.

To be of value the compass must be properly installed and properly compensated. It must be mounted so that it is free from violent vibration. The Navy Standard No. 1 compass is designed to be held down securely. If mounted rigidly to a part of the aeroplane it will function properly. A machine recently flew from Akron, Ohio, to Washington, D. C., entirely by this compass with a final error of only 8 miles.

The compensation of a compass is of great importance. The motor and other masses of metal disturb the earth's magnetic field, so that magnets must be placed near the compass to restore it to the North position. The compensation of the compass must be checked at frequent intervals as the magnetism of the plane is continually changing. If the compass is mounted near a Liberty engine ignition switch (which should always be avoided, if possible) it must be compensated with the ignition circuit closed.

It is seldom possible to completely compensate a compass and resulting errors should be noted on a chart beside the compass. An error of 5 or 6 degrees will often remain on some headings, and this error, if not taken into account, would take a man 40 miles off his course on a 500 mile flight.

In navigation by compass, account must be taken of the variation of the compass. This is the amount that the needle points east or west of true north. As variation varies for different parts of the country it is especially necessary to figure on it on long flights. For instance, the variation at Chicago is 2½° East and at New York is 10½° West. If a man flying from New York to Chicago should neglect this error he would miss Chicago by 50 miles.

Another factor which must be carefully considered in navigating the air is drift. That is, the difference between the heading of a machine and the course actually travelled, the difference being due to the wind.

A pilot flying from New York to Chicago failing to take account of a North wind of only 10 miles an hour intensity would be blown 60 miles off his course, even if he used a 120 mile an hour De Haviland 4 aeroplane. The "drift" must therefore be carefully taken into account. There are instruments on the market which enable the pilot to automatically correct for it.

An air speed indicator must be used to enable the pilot to tell how fast he is going, and knowing this, to judge his distance. As many air speed indicators in common use are found to be from 10 to 30 miles an hour wrong, the calibration of this instrument must also be taken into account. The use of an air distance recorder which, independently of the air speed indicator, shows the pilot the exact number of air miles travelled, is a great assistance.

In fog or clouds the difficulties of aerial navigation are tremendously multiplied and as much flying, such as in the Mail Service, must go on regardless of weather, other instruments are necessary. When it is not possible to see the earth it is very difficult to keep a plane on a straight course, even with the aid of a compass, as all pilots know who have done any flying in bad weather. Once a turn is started the compass is of no value, and much time is lost in straightening out again, if more serious trouble is not encountered. A turn indicator is therefore necessary to advise the pilot instantly of any divergence from his course.

For long flights under bad conditions, a directional stabilizer becomes a necessity as the mental and physical strain on the pilot is completely removed by this apparatus, which takes complete automatic control of the ship's rudder.

A complete automatic aeroplane control is also entirely practical and should be used on large planes.

The Air Mail Service, judging from the lack of results, so far, on the Chicago-New York route, is failing to appreciate the necessity of the instruments and of the proper care of those in use.

THE CURTISS MODEL K-6 AND K-12 AERO MOTORS

In the design of Curtiss K-6 and K-12 motors, the form of construction adopted gives a minimum centre distance between cylinders, together with careful placing of the accessories, makes the motor compact and easily placed in the fuselage, at the same time the accessibility of the various parts is such that sub-unit may be readily inspected or overhauled without disturbing the motor in the aeroplane.

Gear Reduction

The gear reduction of the Model K-12 raises the centre of thrust to a point near the centre of gravity, and close to the centre of projected area. This enables the design of the nacelle or fuselage to be reduced in size, with consequent lower head resistance.

Efficiency

This gear reduction enables high piston speeds to be maintained, which, with the motor's normal high mean effective pressure, increases the power output without increasing the propeller R. P. M. above a normal figure. As a slow speed propeller is 5 per cent to 7 per cent more efficient than a high speed propeller, the geared down motor will deliver a greater net power per pound of gasoline, consequently the overall efficiency is greater.

Crank Case

The design of the crank case, coat of alloy aluminum is such that, due to the cylinder water jackets being integral, extreme rigidity and absolute alignment of parts are maintained, as well as an appreciable saving in lightness gained. The lower half, containing the oil pan is securely bolted to the flange on the centre line of the crank shaft, which also adds to the stiffness of the assembly.

Reduction Gears

The reduction gears of the K-12 are forged from alloy steel. These are rough lanked and cut. The teeth are 5-7 pitch, Fellow's stub tooth form, the teeth staggered, one inch width of face per side. After heat reatment, the centres and faces are ground, and the gears are then recut to insure accuracy and high mechanical efficiency in operations. The standard reduction is from five revolutions of the engine to three of the propeller shaft.

Propeller Shaft

The propeller shaft of the K-12 is made of the same material, and with the same care as the crankshaft. It carries the reduction gear, and the ample grooved plate type thrust bearings, which are mounted to take thrust in both directions.

The front flange for the propeller is machined integrally with this shaft, the flange is drilled for eight bolts, the bolts themselves remaining in the propeller, and are centered by conical split washers. By this system of mounting the propeller is at all times held firmly in place, but the disadvantages of the taper fit hub are done away with and greater lightness secured.

Cylinders

The cylinders are rough machined from a special analysis hydraulic steel forging, heat treated and finished machined all over, with the cylinder head forged integral. This type of cylinder insures maximum strength with minimum weight, the water being in direct contact gives uniform efficient cooling with minimum cylinder distortion.

Connecting Rods

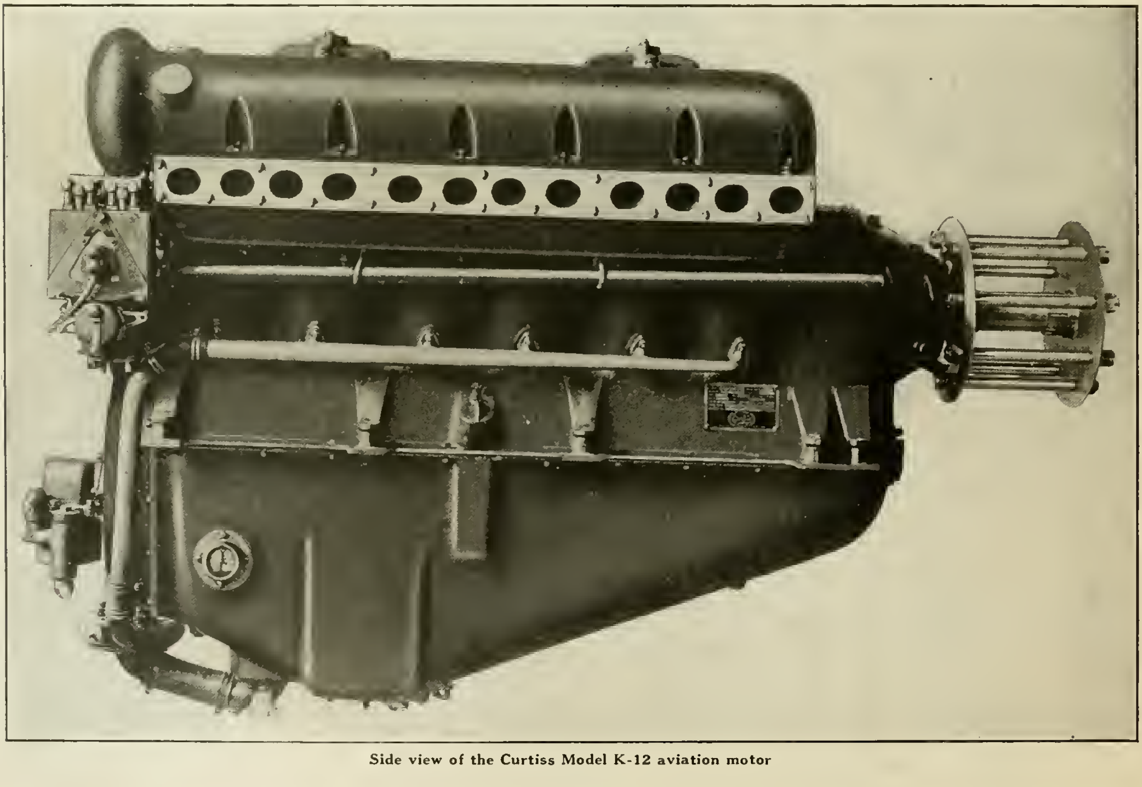
The connecting rods are forged from specially selected steel and are carefully heat treated. The rods are machined all over, and are held to the most accurate limits possible as to size. The finished rods are carefully balanced as to weight, not only with each other as a whole, but as to each end.

Crank Shaft

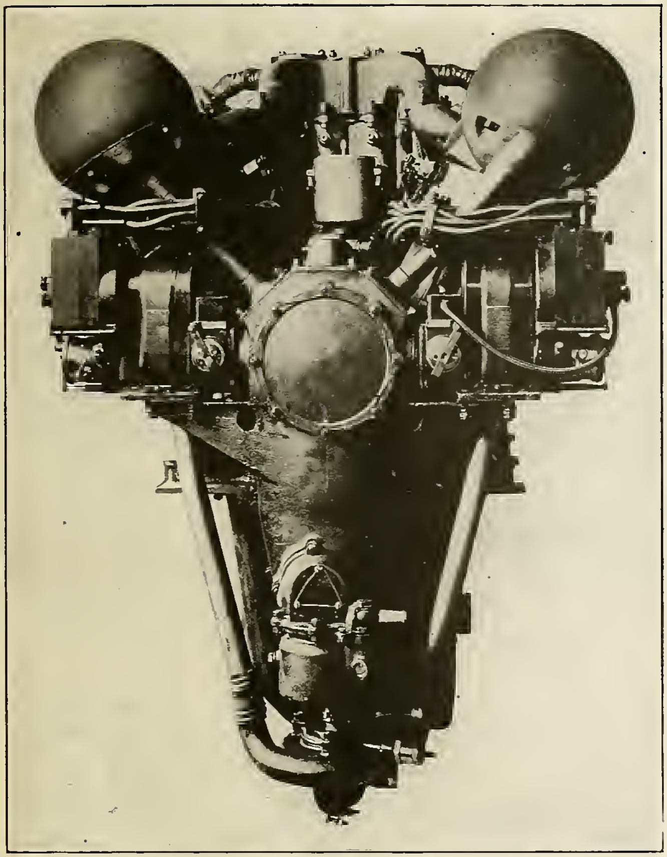
Each crank-shaft has a test piece taken off which goes to the Curtiss laboratories, where all its characteristics are determined to insure that each forging is up to specifications before any machining is started. The inspection of the finished shaft comprises a a minute inspection for checks or surface flaws, a static balance test and finally a running balance test. This care, in producing the shafts coupled with the high grade steel used, and the large dimensions of the shaft itself, insure a product which will stand up indefinitely under the severest strains. The crank-shaft is tapered and keyed to receive the propeller hub, which is drawn tight with a differential thread nut at end of shaft.

Bearings

The Curtiss practice of reaming instead of hand scraping the crank-shaft and connecting rod bearings eliminates the variations that are unavoidable when this is done by hand, and permits replacements without any fitting, as both the inside and the outside diameters of the bearings are held so close in manufacture that new ones will drop more accurately in place than would be possible to fit them by hand.



Side view of the Curtiss Model K-12 aviation motor



Anti-propeller end of the Curtiss Model K-12 aviation motor

Valve Gear

The new valve gear used on the K-12 motor is a distinct advance over previous motors. The light cam follower relieves the valves of any side strains due to cam action, and provides means of easy adjustment of clearance. As the cam shafts are directly over the valves, all rocker arms, push rods, etc., are done away with and the whole assembly is absolutely oil tight.

Ignition

Double ignition, from the two separte magnetos gives a more instantaneous explosion, which at high engine speed is necessary to develop high mean effective pressures. The spark plugs are located near the intake valves, on the upper side, to guard against fouling and insure absolute ignition. The wire assemblies are enclosed in insulating covers of micarta, which guard against short circuit and injury.

Carburetion

A duplex carbureter (K-12 is provided with two carburetors), each tube supplying one set of three cylinders, assures a more satisfactory charge than a single carbureter equipment, due to the separate manifolds which prevent starving and eddying, and the better vaporizing properties of two small carburetors over one large one. In addition, hot water jackets are provided on the manifolds to assist in vaporizing the gasoline.

Lubrication

Pressure feed through crank shaft, propeller shaft and cam shafts, insures a continual film of clean oil on all bearings. Separate return pump with double intake absolutely prevents accumulation of oil in either end of pan, and consequent flooding of cylinders when machine is climbing or gliding. Pressure adjustment permits of individual adequacy of oil feed on each motor, and change for wear and varying conditions of service.

Bolts and Nuts

All bolts and nuts on Curtiss Motors are made from special steel, must be of specified hardness according to sclerescope test, all threads must be accurate to standard gauge. Every nut is either cotter pinned, lock washered, or safety wired in series.

Inspection

Thirteen percent of the labor expense in the Curtiss motor plant is for inspection. Inspection that starts with the composition of raw materials, and follows intimately through all the stages of heat treating, machining, assembling, testing and even shipping.

Type of Motor

K-6 is a six-cylinder water cooled—cylinders en bloc—aluminum construction. K-12 is a 12-cylinder motor with a 5 : 3 gear reduction to propeller shaft.

Horse Power

K-6 rated at 150 H.P. at 1,700 R.P.M. K-12 rated at 375 H.P. at 2,250 R.P.M. at crankshaft.

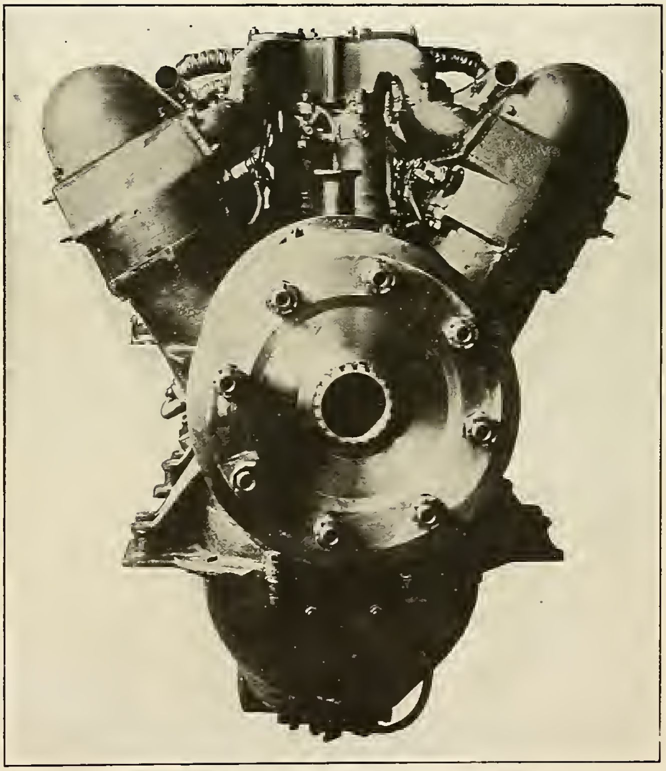
Bore and Stroke

4½" x 6".

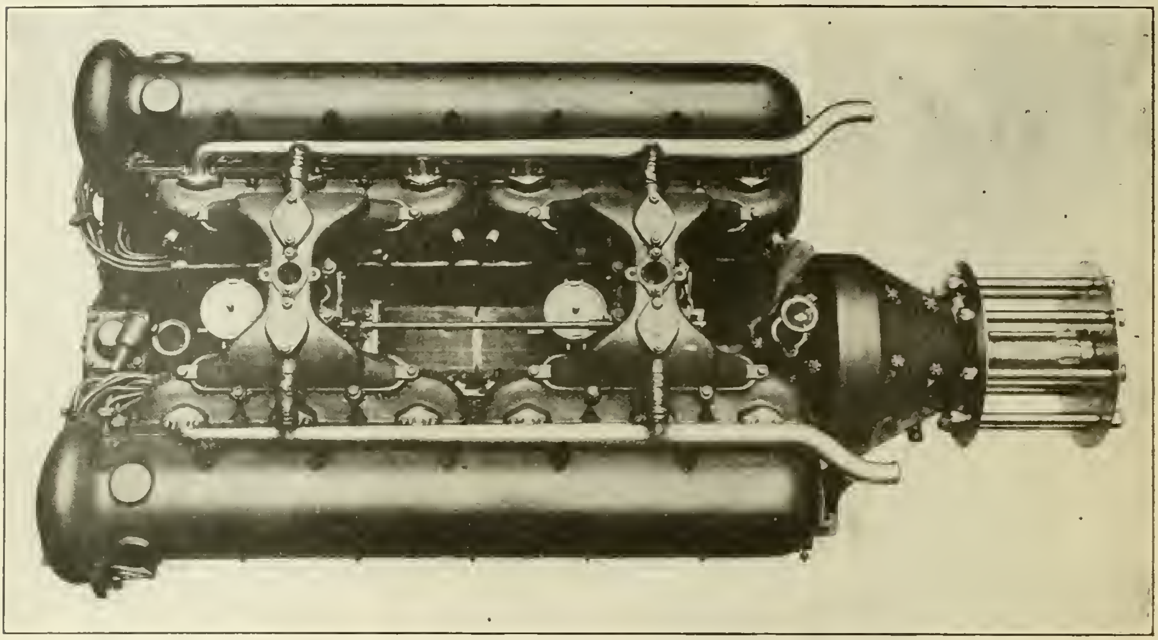
Weights (Lbs.)	Model K6	Model K12
Cooling Water in Motor	—	38
Basic Motor	346	589
Carburetor and Intake Manifold	18	37
Ignition Equipment	32	37
Water Inlet Lines	4	4
Exhaust Manifold	14	28
Hand Starting Crank	3	—

Gasoline Consumption

Fifty-five lbs. per H.P. Hour.



Propeller end of the Curtiss Model K-12 aviation motor



Top view of the Curtiss Model K-12 aviation motor

Ignition

Two high tension six cylinder magnetos complete with spark plugs and wire assembly. Magnetos are located at front end of motor, and driven by bevel gears from vertical shaft through flexible couplings.

Carburetion

Duplex type automatic carburetor located right hand side of cylinder group. K-12 equipped with two duplex carburetors located between the cylinder groups. Auxiliary altitude air valve, hand controlled. Non-backfiring screen connecting air horns.

Lubrication

Adjustable pressure feed—the oil is forced from reservoir in bottom of crank case by gear pump to oil distributing tube, from whence it is fed to each main bearing on the crank shaft, hence through tubes to each connecting rod bearing.

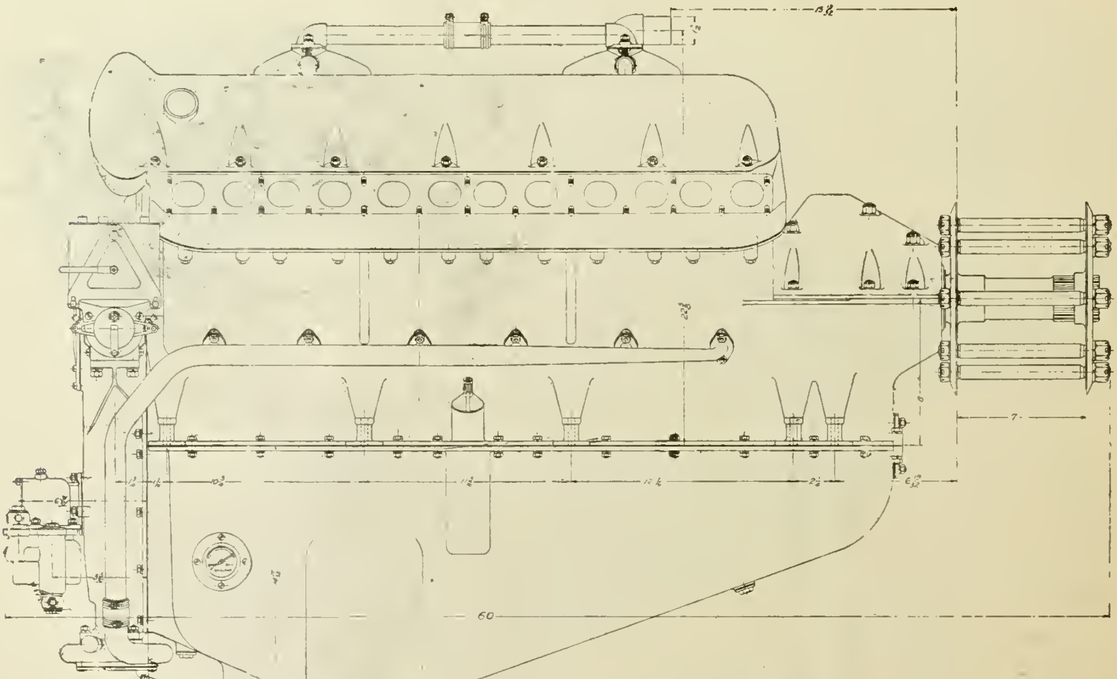


Diagram side view of the Curtiss Model K-12 aviation motor

The pistons and piston pins are fed by spray from connecting rod bearings. At the front main bearings the oil is led up to the hollow cam shafts, circulating through them, and lubricating all the bearings, followers, etc. Gravity return to imperforate splash pan. Return to reservoir by a duplex gear pump with oil leads to both ends of oil pan which prevents flooding when motor is out of horizontal position. Both oil pumps are located inside a large screen on plate on bottom of crank case, removable for inspection and cleaning purposes, and are driven by bevel and helical gears from the vertical shaft. Oil pressure adjustment valve located on outside of removable plate.

Water Circulation

Centrifugal pump. Water is introduced at bottom of each cylinder, is forced through cylinders and intake manifold, thence back to radiator. Water pump is bolted to lower end of gear case at front of motor, and is driven by flexible coupling from vertical shaft.

Cylinders

Steel forgings, machined all over. Top of cylinder threaded and screwed into cylinder head casting, six forming a complete assembly. Cylinder wall ribbed for strength. Cylinder head assembly bolted to crank case which forms water jacket around cylinder sleeves.

Valves

Poppet type in head, two intake and two exhaust per cylinder valves—Tungsten steel. All valves 1⅝" diameter at throat.

Valve Springs

Concentric coil type, alloy steel.

Cam Followers

Tee type, having valve clearance adjustments at ends, bearing surface in center working in cast iron bushing. Wearing surfaces case hardened and ground.

Camshafts

Drop forged with interal cams, separate shafts for inlet and exhaust valves, each pair of valves having one cam, cams case hardened. Six bearings. Finish ground all over.

Camshaft Bearing

Bracket and cap type aluminum bolted to top of cylinder head.

Pistons

Aluminum alloy castings, flat head type. Piston pin bearings in piston without bushings. Three concentric cast iron rings.

Piston Pins

Alloy steel, drilled hollow, case hardened and ground. Pins float in pistons and connecting rods and constrained from end motion by two snap rings in piston.

Connecting Rods

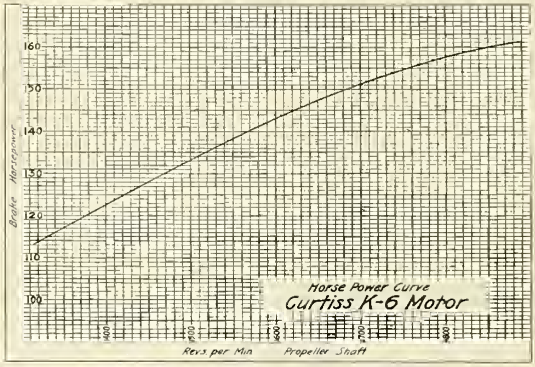
Alloy steel, I-Beam type forgings machined all over.

Connecting Rod Bearings

Main special bearing metal—bronze backed, reamed to running clearance of exact size of crank pin. Held in rod by four brass screws. Ribbed formation at sides to retain oil. Steel cap bolted to rod with four bolts. Piston pin bushings, Non-Gran bronze, drive fit in rods.

Crankshaft

Highest grade alloy steel, finished all over and drilled hollow. All bearings ground. Pins and main bearings 2½" dia. 6 throw, 5 main bearings. End of shaft tapered and fitted with key for propeller hub.



Crankshaft Bearings

Special bearing metal—bronze backed. Reamed to running clearance of exact size of crank shaft.

Propeller Shaft

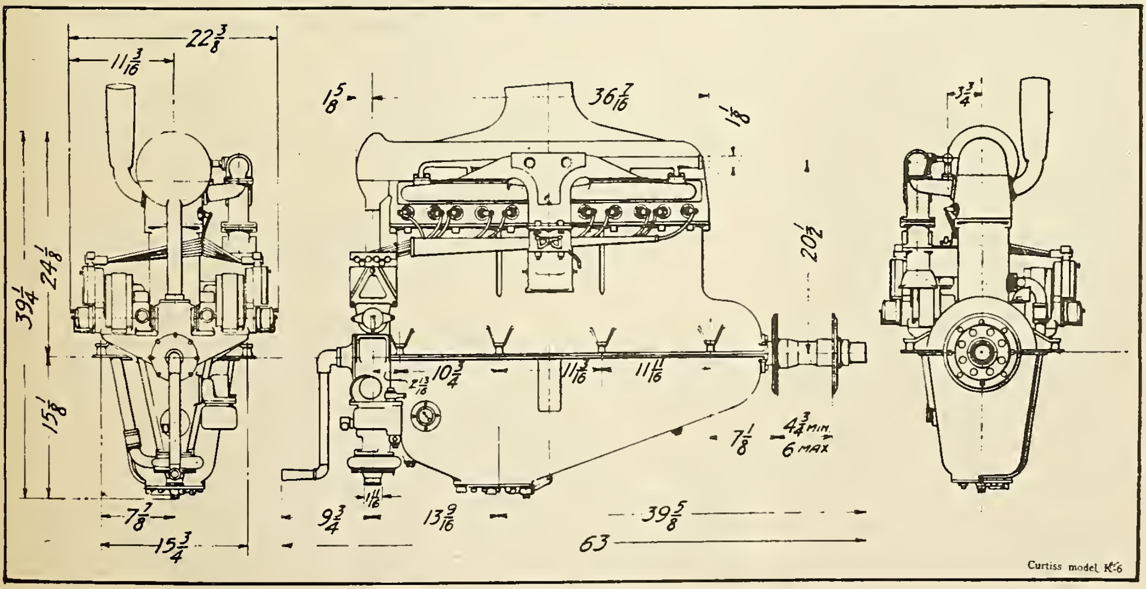
On the K-12 the propeller shaft is of the highest grade alloy steel—finished all over, drilled through. Rear flange of propeller integral with shaft. Flanged for reduction gear. Large isze ball thrust bearings to take thrust as tractor or pusher without change. Propeller shaft mounted in ribbed cap taking thrust bearings and special bearing metal bushings.

Reduction Gears

Reduction gears on the K-12 are forged from alloy steel. Cut 5-7 staggered herring bone, standard reduction 5 to 3. Gears bolted to flanges with alloy steel bolts.

Propeller Thrust Bearing

On the K-6, large deep race annual rbearings arranged to take thrust in either direction mounted between two rear crankshaft bearings.



Anti-propeller end, side, propeller end diagrams of the Curtiss K-6 aero motor

Crank Case

Aluminum alloy castings—bearings in heavily ribbed diaphragms. Eight motor supporting arms—casting extends up to form water cylinder jackets integrally with crank case.

Timing Gears

Cam shafts and accessories driven from vertical shaft by bevels. Bevel drive between crank shaft and vertical shaft. All bevel gears alloy steel, heat treated, and flanged, splined, or integral to shafts.

Magneto Drive

Bevel drive from vertical shaft, running in Annular S.K.F. Bearings contained in removable housing. Flexible coupling between magnetos and gears.

Water Pump

Centrifugal type—cast aluminum housing and blades, coupled to vertical shaft. Bolted to lower face of front gear case.

Tachometer Drive

Shaft gear in aluminum housing driven vertical shaft.

Intake Manifold

Aluminum castings—water jacketed.

Exhaust Manifold

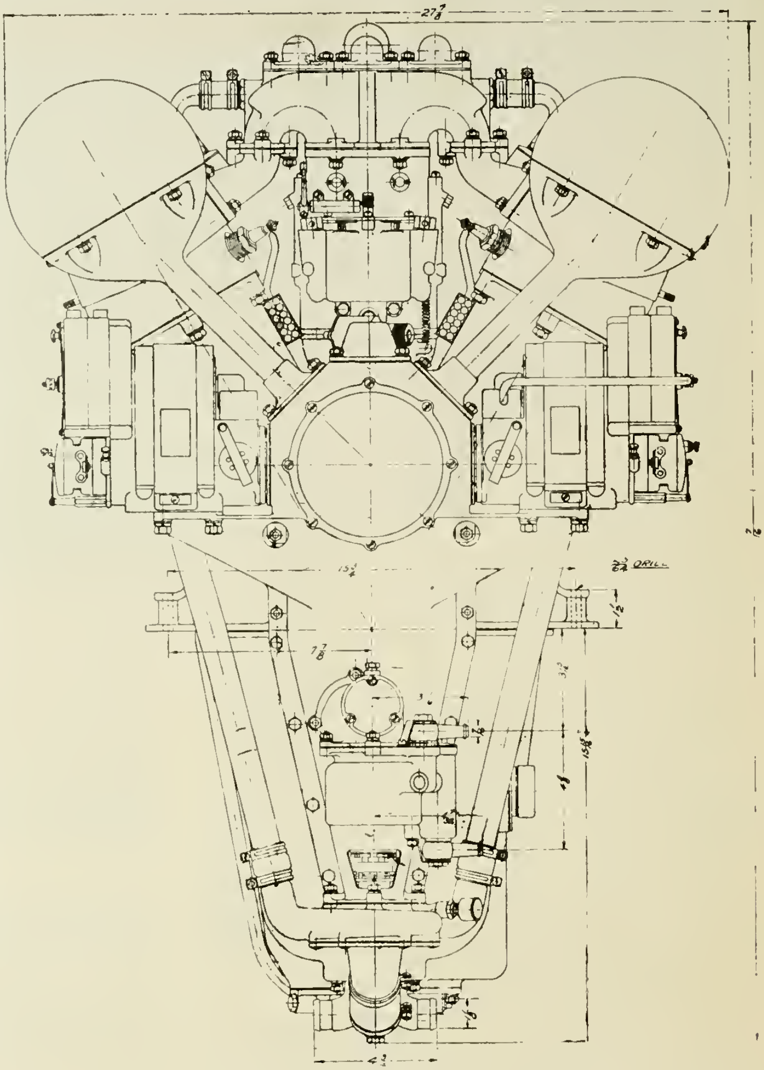
Shee steel, collector type, carrying exhaust gases upward.

Water Piping

Steel tubing, nickel plated inside and out. Rubber hose connections. All cylinder nipples flanged and bolted.

Bolts, Nuts, Etc.

All bolts and nuts alloy steel. Heat treated. All locked with cotter pins on interior, lockwashers on exterior.



Section design Curtiss Model K-12 aviation motor

Appointments in Bureau of Aircraft Production

Washington, Jan. 17.—Lt. Col. R. M. Jones, A. S., A. P., has been appointed Assistant and Executive Officer to the Acting Director of Aircraft Production. In addition to his present duties as Executive Officer, he will also be charged with such activities as pertain to liaison, correspondence with the War Department and other departments or bureaus of the government.

Lt. Col. H. C. Clark, A. S., A. P., in addition to his other duties, will take over the duties of adviser and assistant to the Acting Director on matters pertaining to personnel for the bureau.

Lt. Col. O. Westover, A. S., A. P., is appointed assistant to the Acting Director of Aircraft Production.

Major George F. Lyons, A. S., A. P., is appointed assistant to the Acting Director of Aircraft Production.

Personal Pars

C. H. Smith has recently joined the A. B. C. Casting Co., Cleveland, to take charge of its aluminum forging development work. He was formerly with the Driggs-Seabury Ordnance Corp. and later with the Ladish Forge Co., Cudahy.

F. W. Sutton, formerly production manager of the Continental Motors Corp., and later general superintendent of the Dayton-Wright Airplane Co., is now the chief engineer of the Charles E. Dedeaux Co., industrial engineers, with headquarters in Cleveland.

Peace Delegates' Planes Carry Radiophones

London, Jan. 25.—The aeroplanes which are carrying the Peace Conference delegates and important documents between London and Paris are equipped with wireless telephone apparatus. This enables the pilots to speak to one another while in the air and also enables them to receive frequent weather reports and instructions from the ground.

The Standard Mail Aeroplane

(*Continued from page* 1036)

both wings, 5.2, when overhang section is not used.

Tops of center section struts are spaced 32¼" from center to center. Middle struts 5'–8" from center section struts; outer struts 6'–3" from middle struts. This leaves an overhang of 33½".

When overhang section is used, top of inclined struts are centered 4'–8½" from outer struts, leaving an overhang of 22½".

The "Spad" truss is used between the planes, having a steel tube compression member between front and rear middle struts, where flying and landing cables cross.

Fuselage

The engine is carried on a pyramid type support.

Mail is carried in a compartment situated at the center of gravity, just forward of the pilot's cockpit.

When the machine is at rest, the propeller axis is 6'-0" above ground; in flying position it is 5'–0" above ground. In flying position, a line from wheel base to center of gravity makes a 14° angle with a vertical line.

Angle between line joining wheel base and skid to a horizontal line, 11 degrees—30 minutes.

The stabilizer is fixed at a neutral angle.

Landing Gear

The usual two-wheel landing gear is used, but provision is made for the attachment of a third wheel, as shown in the drawing, which adds 25 lbs. to the weight.

Steel tube is used for chassis members, faired with spruce streamline stiffening pieces.

Engine Group

The engine is a Wright-Martin Model I Hispano-Suiza, giving 150 H.P. at 1,500 r.p.m. and 170 H.P. at 1,700 r.p.m. A detailed description of the Hispano-Suiza appeared in the December 30, 1918, issue of Aerial Age.

The model I is an 8 cylinder V type with a bore of 120 mm (4.724") and a stroke of 130 mm (5.118"). Zenith Carburetor and magneto ignition are used.

Engine weight, with propeller, 455 lbs. Propeller, 9'-0" in diameter.

Fuel consumption, 0.51 lbs. per h. p. per hour; oil consumption, 0.03 lbs. per h. p. per hour. Fuel tanks are located at the center of gravity; their capacity is 60 gallons. Oil tanks located underneath the engine; capacity, 4 gallons.

The nose radiator is of the Livingston type. Water capacity, 9 gallons.

CITATIONS FOR BRAVERY

SECOND LIEUTENANT CHARLES P. PORTER, pilot, Air Service, 147th Aero Squadron. For extraordinary heroism in action in the region of Epips, France, July 16, 1918. While on patrol Lieutenant Porter observed two enemy planes (Fokker type) about 1,000 metres above him. He immediately manœuvred to obtain height and a position for attack. The enemy turned and Lieutenant Porter gave chase and attacked from below, destroying one and forcing the other to retire. A bronze oak leaf for extraordinary heroism in action in the region of Forest de Fere, France, July 24, 1918. Lieutenant Porter, while leading a patrol, attached an enemy formation of twelve planes (Fokker type). He engaged one enemy and sent it down out of control. One of Lieutenant Porter's guns jammed, and while he was repairing the gun two of the enemy planes got behind him. Unable to repair the gun and only to fire a single shot, he turned to attack, destroying a second plane and remained in the fight until the enemy retired. Home address: Charles S. Porter, father, 121 to 131 West Twenty-seventh street, New York City, N. Y.

First Lieutenant Leslie J. Rummell, Air Service, Ninety-third Aero Squadron. For extraordinary heroism in action in the region of Mosery, France, September 29, 1918. Lieutenant Rummell, leading a patrol of three planes, sighted an enemy biplane, which was protected by seven machines (Fokker type). Despite the tremendous odds he led his patrol to the attack and destroyed the Di Nash plane. By his superior manœuvring and leadership four more of the enemy planes were destroyed and the remaining three retired. Home address: Alfred T. Rummell, brother, Pennington and Johnson streets, Newark, N. J.

First Lieutenant William H. Stovall, pilot, Air Service, Thirteenth Aero Squadron. For extraordinary heroism in action in the region of Etain, France, September 26, 1918. While leading a protection patrol over a day-bombing formation, Lieutenant Stovall's patrol became reduced, through motor trouble, to himself and one other pilot. When the bombing patrol was attacked by seven enemy planes, Lieutenant Stovall in turn attacked the enemy and destroyed one plane. Home address: Mrs. William H. Stovall, mother, Stovall, Miss.

First Lieutenant Alfred B. Patterson, Jr., pilot, Air Service, Ninety-third Aero Squadron (deceased). For extraordinary heroism in action in the region of Moiery, France, September 29, 1918. Lieutenant Patterson, while on a patrol with two other machines, attacked an enemy formation of seven planes (Fokker type) that were protecting a biplace plane. They destroyed the biplane and four of the Fokkers, forcing the remaining three to retire. A bronze oak leaf for extraordinary heroism in action in the region of Moiery, France, October 23, 1918. Lieutenant Patterson led a formation for the purpose of protecting our bombing planes, the accompanying planes being obliged to return, due to engine trouble. Despite this fact, Lieutenant Patterson proceeded on the mission alone. He sighted an enemy patrol of nine machines (Fokker type) and attacked them, driving one down. Home address: A. B. Patterson, father, 438 Franklin avenue, Wilkinsburg, Pa.

First Lieutenant Charles E. Wright, pilot, Air Service, Ninety-third Aero Squadron. For extraordinary heroism in action near Keffu, France, in October, 1918. Lieutenant Wright attacked an enemy observation balloon protected by four enemy planes and, despite numerical superiority, he forced the planes to withdraw and destroyed the enemy balloon. A bronze oak leaf, for extraordinary heroism in action near Bantheville, France, October 23, 1918. Lieutenant Wright, accompanied by one other machine, attacked and sent down in flames an enemy plane (Fokker type) that was attacking an Allied plane. He was in turn attacked by three enemy planes. His companion was forced to withdraw on account of motor trouble. Lieutenant Wright continued the combat and succeeded in bringing down one of the enemy planes and forced the remaining two into their own territory. Home address: Mrs. R. W. Wright, mother, 131 Southerland road, Brookline, Mass.

Major Lewis H. Brereton, pilot, corps observation wing. For extraordinary heroism in action over Thiaucourt, France. Major Brereton, together with an observer, voluntarily, and pursuant to a request for special mission, left his airdrome, crossed the enemy lines over Lironville, and proceeded to Thiaucourt. In spite of poor visibility, which forced them to fly at a very low altitude, and in spite of intense and accurate antiaircraft fire they maintained their flight along their course and obtained valuable information. Over Thiaucourt they were suddenly attacked by four enemy monoplane Fokkers. Maneuvering his machine so that his observer could obtain a good field of fire, he entered into combat. His observer's guns becoming jammed, he withdrew until the jam was cleared, when he returned to the combat. His observer then becoming wounded, he cooly made a landing within friendly lines, although followed down by the enemy to within 25 meters of the ground. By this act he made himself an inspiration and example to all the members of his command. Home address, Mrs. Lewis H. Brereton, wife, Ontario Apartments, Washington, D. C.

Second Lieutenant Elmer K. McKay, Air Service, observer, 96th Aero Squadron. For extraordinary heroism in action near Dun-Sur-Meuse, France, October 23, 1918. Lieutenant McKay, with First Lieutenant Harry O. McDougall, pilot, while on a bombing mission displayed exceptional courage by leaving a comparatively secure position in the center of the formation during a combat with five enemy planes and going to the protection of two other officers whose planes had been disabled and forced out of the formation. While his pilot skilfully maneuvered the machine, Lieutenant McKay shot down one of the adversaries and fought off the others, thereby saving the lives of the officers in the disabled American plane. Home, address, James D. McKay, father, 817 Eleventh Street N. E., Washington, D. C.

First Lieutenant Harry O. McDougall, Air Service, pilot, 96th Aero Squadron. For extraordinary heroism in action near Dun-Sur-Meuse, France, October 23, 1918. Lieutenant McDougall, with Second Lieutenant Elmer McKay, observer, while on a bombing mission, displayed exceptional courage by leaving a comparatively secure position in the center of the formation during a combat with five enemy planes and going to the protection of two other officers whose planes had been disabled and forced out of the formation. Lieutenant McDougall skilfully maneuvered his machine so as to enable Lieutenant McKay to shoot down one of the adversaries and fight off the others. Home address, D. C. DcDougall, father, 132 South Hayes Street, Pocatello, Idaho.

Lieutenant Kingman Douglass, Air Service, pilot, 91th Aero Squadron. For extraordinary heroism in action near Longuyon, October 31, 1918. While on a photographic mission Lieutenant Douglass encountered a superior number of enemy pursuit planes. Notwithstanding the odds against him, he turned and dived on the hostile formation, destroying one plane and damaging another. He then continued on his mission and returned photographs of great military value. Home address, W. A. Douglass, 317 North Kenilworth Avenue, Oak Park, Ill.

First Lieutenant Ora R. McMurry, American Expeditionary Forces, 49th Aero Squadron. For extraordinary heroism in action near Ormagne, France, October 4, 1918. Lieutenant McMurry was a member of a patrol of 7 machines which attacked 17 enemy Fokkers. After shooting down one of the enemy, this officer returned to the fight and shot down another. Home address, Mrs. J. C. McMurry, mother, Evansville, Wis.

First Lieutenant Lewis C. Plush, Air Service, 49th Aero Squadron. For extraordinary heroism in action near Romagne, France, October 4, 1918. Lieutenant Plush was a member of a patrol of 7 machines which attacked 17 enemy Fokkers. After shooting down one of the enemy, this officer returned to the fight and shot down another. Home address, William Plush, father, 440 East Phillips Boulevard, Pomona, Cal.

Captain Walter R. Lanson, Air Service, observer, 91st Aero Squadron. For repeated acts of extraordinary heroism in action near St. Mihiel, France, July 30 and September 13, 1918. This officer showed rare courage on a reconnaissance far over the enemy lines, when he continued on his mission after being seriously wounded by anti-aircraft fire. On September 13, although he was still convalescing from his wound, he volunteered for a particularly dangerous mission requiring a flight of 75 kilometers within the enemy lines. Because of weather conditions he was forced to fly at a dangerously low altitude and was repeatedly fired on by anti-aircraft and machine guns. He successfully accomplished his mission and returned with important information. Home address, Mrs. W. R. Lasson, wife, Birmingham, Ala.

First Lieutenant Harvey Conover, Air Service, pilot, 3d Observation group. Deceased. For extraordinary heroism in action near Consenvoye, France, October 27, 1918. Flying at an altitude of less than 50 meters over enemy artillery and machine guns, which were constantly firing on him, Lieutenant Conover and his observer staked the American front lines and gave valuable information and assistance to the advancing infantry. Although suffering from two severe wounds, and with a seriously damaged plane, he delivered a harassing fire on six enemy machine-gun nests which were checking the advance of the ground troops, and successfully drove off the crews of four guns and silenced the other two. He then made a safe landing and forwarded his information to division headquarters before seeking medical aid. Home address, L. P. Conover, father, Hinsdale, Ill.

First Lieutenant Benjamin P. Harwood, Field Artillery, Air Service. For extraordinary heroism in action near Chateau-Thierry, France, July 5, 1918. Lieutenant Harwood volunteered with another plane to protect a photograph plane. In the course of their mission they were attacked by seven enemy planes (Fokker type). Lieutenant Harwood accepted the combat and kept the enemy engaged while the photographic plane completed its mission. His guns jammed and he himself was seriously wounded. After skilfully clearing his guns, with his plane badly damaged, he fought off the hostile planes and enabled the photographic plane to return to our lines with valuable information. Home address, E. N. Harwood, father, Billings, Mont.

First Lieutenant Leo C. Ferrenbach, Air Service. For extraordinary heroism in action near Ansauville, France, July 22, 1918. Lieutenant Ferrenbach, a balloon observer, was conducting an important surveillance of his sector when at an altitude of 800 meters successive attacks were made upon the balloon by enemy planes. This officer refused to leave his post and continued his work with strong enemy patrols hovering above him until one of the hostil machines dived and set fire to the balloon. After he had jumped in his parachute, the burning balloon fell and barely missed him. Lieutenant Ferrenbach immediately reascended while enemy patrols were still in the vicinity. Home address, Edward J. Ferrenbach, father, 5441 Bartmer Avenue, St. Louis, Mo.

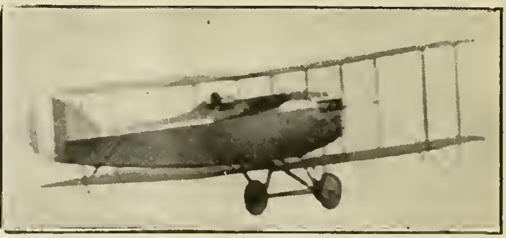
First Lieutenant J. A. Higgs, Air Service. For repeated acts of extraordinary heroism in action near Pont-a-Mousson, France, July 31 and August 21, 1918, near Gesnes, France, October 29, 1918. On July 31, near Pont-a-Mousson, Lieutenant Higgs was carrying on a general surveillance of his sector from his balloon with a French soldier, when an enemy plane dived from a cloud and opened fire on the balloon. In imminent danger he remained in basket until he had helped his French comrade, after whom he himself jumped. On August 21, in the same sector, Lieutenant Higgs was performing an important mission regulating artillery fire. Enemy planes attacked, and with great gallantry Lieut. Higgs remained in the basket until his assistant had jumped. On October 29, near Gesnes, Lieutenant Higgs was conducting a reglage from the basket with a student observer. Attacked by enemy planes, after his balloon was burning, Lieutenant Higgs would not quit his post until he had assisted his companion to escape. In each of the foregoing instances, Lieutenant Higgs at once reascended in a new balloon. Home address, Mrs. James A. Higgs, wife, Lathrop, Pickens County, Ala.

Second Lieutenant Cleveland W. McDermott, Air Service, 147th Aero Squadron. For extraordinary heroism in action near Bantheville, France, October 18, 1918. In starting on a patrol mission Lieutenant McDermott was delayed by motor trouble. Unable to overtake the other machines, he continued on alone. Sighting an enemy Fokker, he immediately gave chase, and despite its effort to escape, succeeded in shooting it down. Six Fokkers then suddenly attacked him, and though he was outnumbered and blinded by the sun, he shot down one of them and scattered the others. In the midst of this combat his motor stopped, and he was forced to glide into friendly territory. Home address, John McDermott, father, 209 Jackson Street, Syracuse, N. Y.

First Lieutenant Cleo J. Ross, deceased, Air Service, for extraordinary heroism in action near Brabant, France, September 26, 1918. Lieutenant Ross was engaged in an important observation, regulating artillery fire, when his balloon was attacked by enemy planes. One of the planes dived from a cloud and fired at the balloon, setting fire to it, and though he could have jumped from the basket at once he refused to leave until his companion, a student observer, had jumped. Lieutenant Ross then leaped, but it was too late, for the burning balloon dropped on his parachute. He was dashed to the ground from a height of 300 meters and killed instantly. Next of kin, E. M. Ross, father, Titusville, Pa.

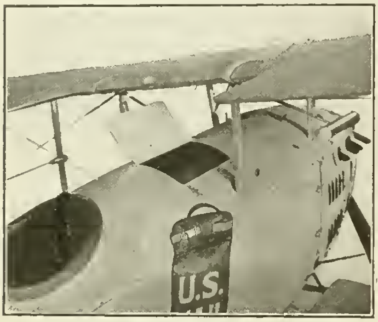
First Lieutenant Ralph O'Neill, Air Service, pilot, 147th Aero Squadron, for the following act of extraordinary heroism in action near Fresned, France, July 24, 1918. A bronze oak loaf is awarded to Lieutenant O'Neill, to be worn on the distinguished service cross awarded to him October 12, 1918. Lieutenant O'Neill, with four other pilots, engaged 12 enemy planes discovered hiding in the sun. Leading the way to an advantageous position by a series of bold and skillful maneuvers, Lieutenant O'Neill shot down the leader of the hostile formation. The other German planes then closed in on him, but he climbed to a position of vantage above them and returned to the fight and drove down another plane. In this encounter he not only defeated his opponents in spite of overwhelming odds against him, but also enabled the reconnaissance plane to carry on its work unmolested. Home address, Mrs. R. L. O'Neill, mother, 218 Sonoita Street, Nogales, Ariz.

THE STANDARD MODEL E-4 MAIL AEROPLANE



MAIL is now carried between New York and Washington in the specially built "E-4" mail machine brought out by the Standard Aero Corporation. Other air mail routes contemplate the use of the "E-4", because of the special features of its design, and particular adaptability to the work.

For winter flying, overhang extensions are attached to the ends of upper wings, increasing the span from 31'-4¾" to 39'-8¾".



Compartment for carrying mail on the "Standard" Mail Aeroplane

General Dimensions

Span, upper plane	31'-4¾"
(Span, upper plane with overhang)	39' 8¾"
Span, lower plane	31'-4¾"
Chord, both planes	6'-0"
Gap between planes	5'-6"
Stagger	5¼"
Length overall	26'-2"
Height overall	10'-10 3/16"

Areas

Upper plane	174.9
(Upper plane with overhang)	220.3
Ailerons (2 upper and 2 lower)	48.
(Ailerons with overhang)	56.
Lower plane	162.1
Total wing area with ailerons	337.0
(Total wing area, with overhang)	382.4
Stabilizer	23.7
Elevator	22.0
Fin	4.6
Rudder	10.1

Weights, General

Machine empty	1566
(Machine empty, with overhang)	1616
Fuel and oil	390
Useful load	444
Total weight, loaded	2400
(Total weight, loaded, with overhang)	2450
Weight per H.P.	14.1
Weight per sq. ft.	7.12
(With overhang; weight per H.P.)	14.4
(With overhang; weight per sq. ft.)	6.4

Summation of Weights

	Weight (*lbs.*)	Percentage of Gross Weight
Power Plant	778.5	32.4
Fuel and Oil	390.	16.2
Pilot & miscel. equip.	364.3	11.0
Mail	180.0	7.5
Body Structure	288.1	12.0
Tail surfaces with brac'g	75.5	3.2
Wing structure	324.0	13.5
Chassis	100.0	4.2
Total	2400.0	100.0%

WEIGHT SCHEDULE

Power Plant

	Pounds
Engine complete with carburetor and ignition system	455
Radiator	74.5
Water	75
Fuel and Oil Tanks empty	50
Propeller and Hubs	27.5
Cowling	61.5
Pipes, etc.	35
Total	778.5

Fuel and Oil

Fuel (60 gallons)	360
Oil (4 gallons)	30
Total	390

Pilot and Equipment

Pilot and clothing	170
Dashboard Instruments	32.25
Miscellaneous	62
Total	264.3

Mail

Mail	180
Total	180

Body

Body frame	219
Engine bed	14
Seats and floor	31.3
Front and rear control	23.75
Total	288.1

Tail Surfaces with Bracing

Stabilizer	24.0
Elevators	17.5
Fin	3.0
Rudder	9.5
T.B., fittings, wires, etc.	21.5
Total	75.5

Wing Structure

Upper wing with fittings and ailerons	143.5
Lower wing with fittings and ailerons	129.5
Interplane Struts and cables	51.
Total	324.0

Chassis

Wheels complete; Axle; Shock Absorber, and Parts	96
3 Wheel Type Landing Gear	25
Total	121

Performances

Height (*ft.*)	Speed (*M.P.H.*)	Time of Climb (*min.*)	Rate of Climb (*ft. per min.*)
0	100	0	700
5,300	...	10	...
10,000	...	24	...

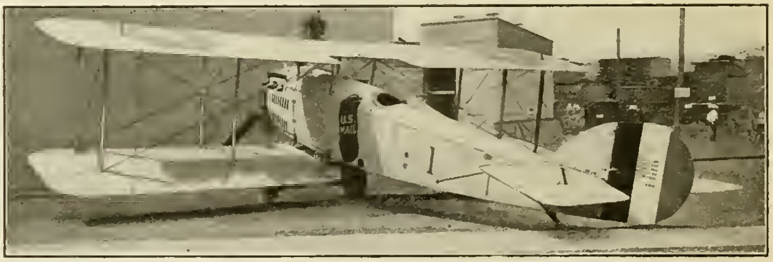
Stalling Speed	50 m.p.h.
Gliding Angle	1 to 8
Maximum Range	280 miles
Hours flight, full speed at 5,000 feet	3 hours

Main Planes

Both planes are swept back at a 5° angle, and both have a 3% or 1¾° dihedral. There is no decalage; the incidence or angle of the wing chord to the propeller axis, is 2½°.

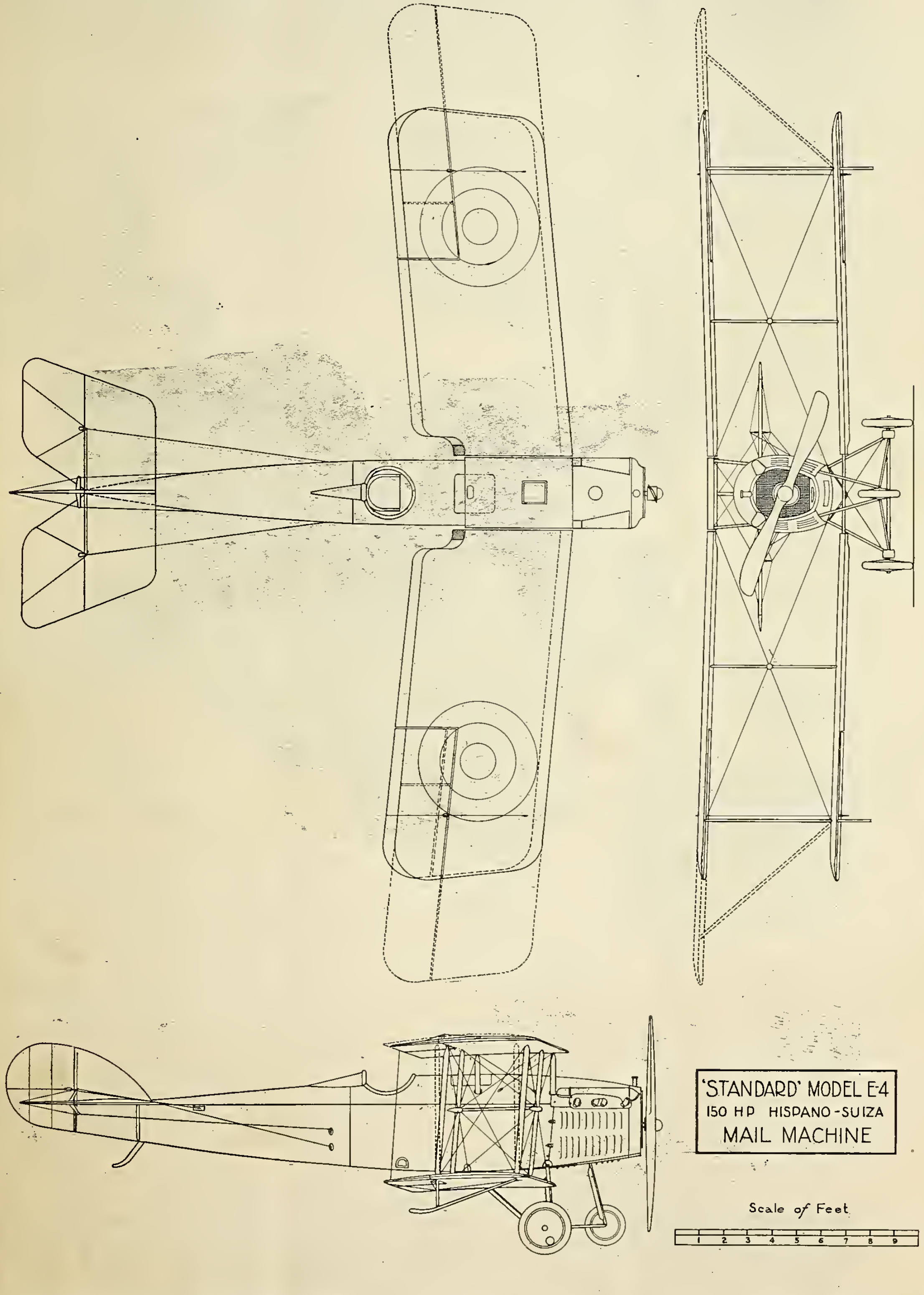
Wing section, R.A.F. 15. Aspect ratio of

(*Continued on page* 1034)



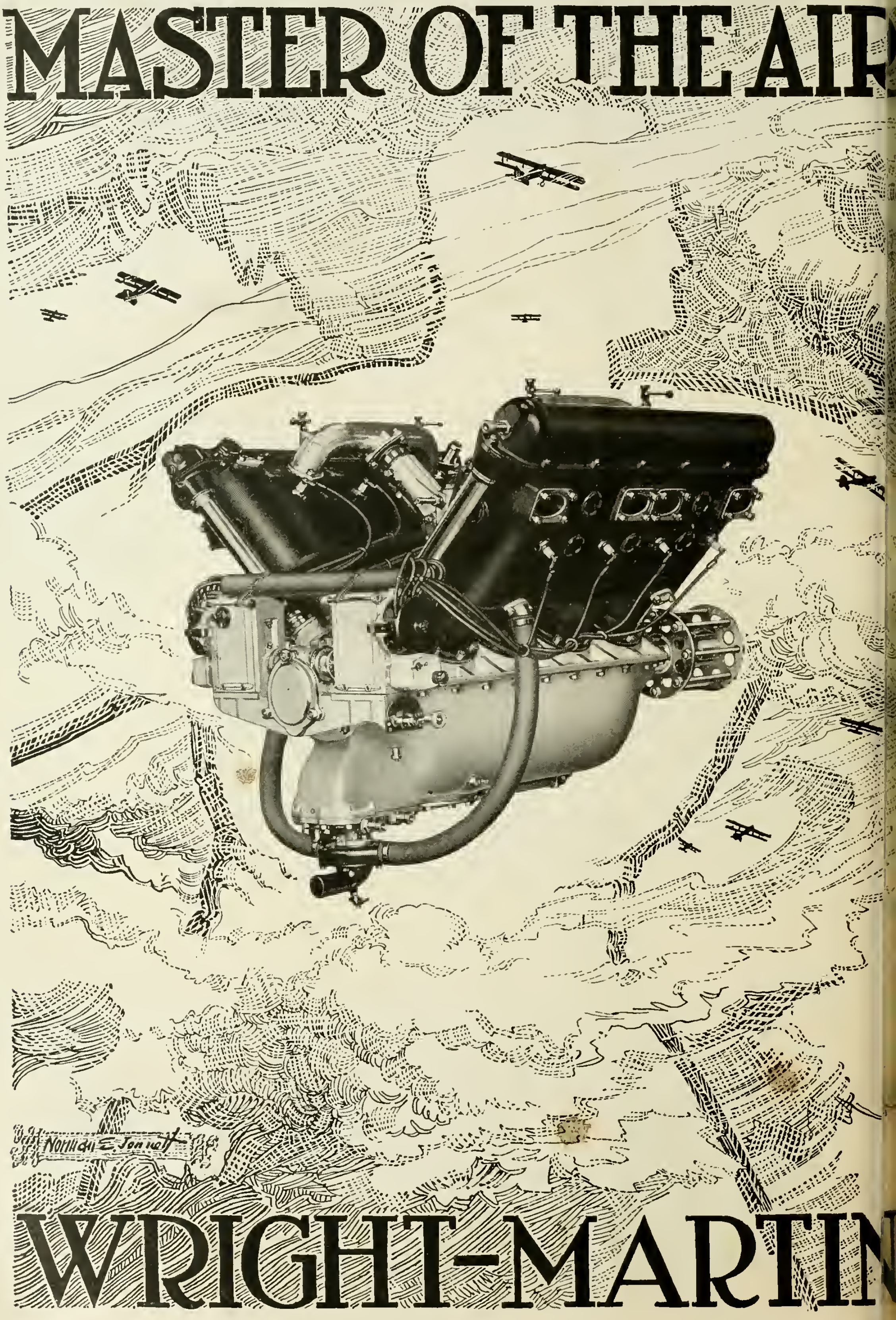
Three-quarter rear view of the Standard Model E-4 Mail Aeroplane

A group of Standard E-4 Aeroplanes at one of the air mail stations



'STANDARD' MODEL E-4
150 HP HISPANO-SUIZA
MAIL MACHINE

McLaughlin


MASTER OF THE AIR
Norman E. Jonnett
WRIGHT-MARTIN

he Hispano-Suiza Engine

HISPANO-SUIZA developed its world-wide reputation during the early stages of the Great War.

The very peak of its efficiency was reached when the Air Forces of France and England were gaining that now well-understood "Air Supremacy" at the end of the second year of the Struggle. It was then that France's most noted aces, Guynemer, Fonck, Herteaux and others were establishing their marvelous records in the small, swift, deadly one-seater planes—the "Spads"—which were made possible only because of the speed, flexibility and versatility of the Hispano-Suiza Engine.

Since then, in the powering of the one seaters, the two and three seaters, and the heavier bombing machines and hydroplanes, Hispano-Suiza has kept pace with the development of the aeronautical activities of several nations. Hispano-Suiza has reached that point of efficiency which would have been impossible, except where a fundamentally great engine had been developed by the most progressive brains of the industry.

These are the reasons for the mastership of Hispano-Suiza.

Wright-Martin
Aircraft Corporation
NEW BRUNSWICK, N. J., U. S. A.

See The Hispano-Suiza Exhibit at the Aero Show March 1-15, 1919

IRCRAFT CORP'N.

COLONEL DEEDS NOT TO BE COURT-MARTIALED

(Concluded from last issue)

III

Statement Regarding Transfer of Stock in Domestic Building Company

The affidavit of Judge McCann, Colonel Deeds' attorney, which was submitted to this office, shows that the Domestic Building Company was a corporation created for the development of certain real property near Dayton, Ohio, including the erection and leasing of factory buildings. The company had, at the time Col. Deeds was commissioned, about completed a large factory building for the use of the Domestic Engineering Company, which was engaged in manufacturing Delco light plants. It was contemplated that this property was to be leased to the Dayton Wright Airplane Company for the manufacture of aeroplanes. At the time when Judge McCann went to Washington at the request of Col. Deeds when the latter was commissioned, he prepared, and Col. Deeds signed and forwarded a resignation as President and Director of the Domestic Building Company. At the same time he prepared the letters to the Aircraft Production Board and to the Secretary of War heretofore discussed. In the letter to the Aircraft Production Board he stated that he had made a bona fide transfer of all his stock in the Domestic Building Company.

Col. Deeds' instructions to Judge McCann had been to promptly take all steps necessary to carry into legal effect the various transfers mentioned in the letter. On Judge McCann's return to Dayton he found that the Dayton Wright Airplane Company had determined to purchase outright the plant erected by the Domestic Building Company, instead of carrying the property by lease. Under these circumstances Judge McCann stopped action on the resignation of Colonel Deeds from that company, and advised that the transfer of his stock was not necessary; and as a matter of fact the transfer was never made.

It appears from Colonel Deeds' testimony taken by Judge Hughes, that prior to writing the letter of August 28th, Mr. Kettering had agreed to take this stock off of Colonel Deeds' hands at whatever the books showed its value to be, should it become necessary to make the transfer, though the agreement was not in writing which would not be unnatural in view of the close relations existing between these gentlemen.

Upon th evidence now before this office it is of opinion that court-martial proceedings against Col. Deeds, based upon his statement regarding his stock in the Domestic Building Company, should not be instituted, because (1) at the time the statement was made an arrangement had been entered into for the sale of this stock at its book value; (2) it took time to ascertain the book value and close the details of the transaction; (3) it was the *bona fide* intention of Col. Deeds to make the formal transfer, and he had given instructions to have this done; (4) the reason why it was not done was that through a legitimate change of plan, the occasion for the transfer was obviated, and both parties to the contemplated transfer were willing that the agreement for transfer should be cancelled; (5) the whole proceeding was conducted in good faith and under the advice of counsel.

IV

Publication Regarding Aircraft

The following is contained in the original memorandum from this office, the statements having been based solely upon the report made by Judge Hughes of his investigation of the aircraft situation:

> "The report of Judge Hughes also finds that Col. Deeds authorized and sanctioned issuance for publication of a false and misleading statement by the Committee on Public Information, concerning the shipment of American-built battle planes to France. The official statement by the Committee on Public Information released for publication in the newspaper on February 21, 1918, contained the following:
>
> "'The first American-built battle planes are today en route to the front in France. This first shipment, though in itself not large marks the final overcoming of many difficulties met in building up this new and intricate industry.' (P. 116.)
>
> "It is found that this statement had its origin in a conversation between Colonel Deeds and a representative of the Committe on Public Information a week or two before the completed statement was issued. A draft was first prepared and submitted to Colonel Deeds, who examined it and made some corrections. The statement contained in the paragraph above quoted was not only left unchanged, but was the subject of special inquiry by the representative of representatives of the Committee. Col. Deeds was asked what was mant by the 'fisrt shipment,' and he replied: 'They are on the water now, on the way to France.' He was then asked: 'How many?' and he answered, 'I do not know, but I do not think more than ten.' The statement, in its final form, was then presented to the Secretary of War, who permitted it to be issued upon the understanding that it had been verified by General Squier and Col. Deeds. At the time this statement was issued, February 20th, only one plane had been delivered for shipment to the American Expeditionary Forces, and while this had been shipped from the factory on February 5th, it did not leave the United States until March 22d. No additional shipments of aeroplanes for the use of our forces abroad were made until April 3, 1918. The report states that Colonel Deeds admitted that this statement was brought to him before its publication, and that he went through it. He examined it minutely enough to correct with his own hands one of the paragraphs following that above quoted, which gave the number of men required on the ground for every plane in the air, his correction making it 46 instead of 45. Col. Deeds denied, however, that he said in response to the inquiry upon the point that the battle planes were 'on the water now, on the way to France.' That he did make this statement, it is found, was testified to directly and unequivocally by John W. McConaughy and Marlen E. Pew, representing the Committee on Public Information."

Since the matter has been re-referred to this office for examination based upon all facts known to the Department and for further report after examining the testimony taken by Judge Hughes, careful consideration has been given to the testimony on the subject. An intellignt understanding of the facts can only be obtained after a somewhat detailed statement of the evidence, which will involve a description of three exhibits filed with Judge Hughes, labeled respectively, "McConaughy Ex. 1," "McConaughy Ex. 2," and "McConaughy Ex. 3."

What was known as "McConaughy Ex. 2" was a typewritten statement consisting of three pages, the first page containing at the top two paragraphs, of which the paragraph quoted in the Hughes report was the *second*. These two paragraphs of this exhibit were pasted upon a page, immediately below which appeared two other paragraphs, the first of which had been stricken out with lead pencil, and had superimposed upon it another pasted paragraph. It will be observed that the first page of "McConaughy Ex. 2" therefore was considerably mutilated. The second page consisted of a blank page upon which was pasted a sheet of paper containing three paragraphs. The third page was typewritten without anything having been pasted upon it.

"McConaughy Ex. 3" was practically a copy of "McConaughy Ex. 2" as it appears in its present condition, this copy having been prepared in the office of Mr. J. W. McConaughy, an employee of the Committee on Public Information. It was prepared with the object of having it mimeographed for publication by the press of the country. "McConaughy Ex. 1" was a mimeographed copy of "McConaughy Ex. 3."

Although the evidence clearly establishes that Colonel Deeds never saw either the papers marked "McConaughty Ex. 1" or "McConaughy Ex. 3," yet, when he was called as a witness during the prosecution of the inquiry, he was handed "McConaughy Ex. 1" and asked if he had ever seen it before, to which he responded that he had and that he had seen it before its publication, although he had read it only in a very general way. As the fact clearly demonstrated by McConaughy's testimony is that Col. Deeds had never seen "McConaughy Ex. 1," it is necessary to consider what he actually did see in the general way he mentioned. McConaughy could not throw any light on this subject. He testified that he was not present at any interview when any paper was submitted to Col. Deeds. The only persons present at such an interview were Captain Sweetser, an officer of the Signal Corps, and Marlen E. Pew, an employee of the Committee on Public Information. Capt. Sweetser testified that he had written up "McConaughy Ex. 2" sometime before, with the exception of the paragraph relating to the Liberty Motor (which was the third paragraph on "McConaughy x.2," being a paragraph which had been pasted over the original third paragraph thereof); that "McConaughy Ex. 2" had been written up after a chance talk with Col. Deeds during the course of which the latter had stated that we were "over the bump" and "the planes had actually begun going or something of that sort," something which Sweetser interpreted to mean that the planes were actually *en route*, although Sweetser would not swear that Col. Deeds told him that the battle planes were actually *en route* to France; that he had subsequently presented this statement to Colonel Deeds and that Deeds had told him that he had decided not to give it out at that time; that later on Sweetser went over to the Committee on Public Information and saw McConaughy and Pew and suggested to them that the story should be written up stating that the first battle planes were going across; that he returned with Pew to the Department and wrote up a paragraph to the effect that the planes as equipped with the first Liberty motors were being shipped; that he and Pew then went in to see Col. Deeds and submitted 'the story" to him and that Col. Deeds sat on the desk and read it through; but that the statement submitted to Deeds was not "McConaughy Ex. 2" at all, but that the paper submitted to him contained a statement that the Liberty motor had 450 horse power, and that Col. Deeds instructed Sweetser not to make that feature public. Capt. Sweetser said, however, that the paper that was submitted to Deeds did contain a statement that the first American-built planes "are today *en route* to the front in France." The particular paper which Sweetser said Col. Deeds saw was not identified nor produced.

Mr. Pew testified definitely that the paper submitted to Col. Deeds on this occasion was "McConaughy Ex. 2" *without the first two paragraphs* on page 1. This statement is important because it is the *second* paragraph on page 1 which is the subject of the criticism against Col. Deeds. They both agree, therefore, that Col. Deeds never saw the second paragraph of "McConaughy Ex. 2," unless the testimony of Pew is correct to the effect that after the first interview with Col. Deeds at which he and Captain Sweetser were present, they rewrote paragraphs 1 and 2 of page 1 of "McConaughy Ex. 2" and then took it back to Col. Deeds, who read it over carefully and changed the figures "47" to "46" as they appear in the 4th paragraph of the first page of that exhibit, and at the same time Capt. Sweetser made several pencil changes on the first page of that exhibit in Col. Deeds' presence. The fact should be borne in mind that paragraphs 1 and 2 of page 1 of that exhibit are pasted on to the page containing paragraphs 3 and 4.

In this connection it is noteworthy that Captain Sweetser testified that these paragraphs land 2 on page 1 had been written long *before* the interview with Col. Deeds about which he testified, and not *afterwards*, and that the pencil changes made by him were made *before* the paper was submitted and not *afterwards*, Capt. Sweetser made no mention of a second interview with Col. Deeds, and says that at the conclusion of the interview about which he testified, he and Pew separated and that Pew went back to his office.

It is also important to observe that, whereas Pew testified that Col. Deeds stated at the second interview that the planes referrrd to in the second paragraph of "McConaughy Ex. 2" were on the water, Capt. Sweetser testified that Col. Deeds said nothing specific about that but he (Sweetser) gathered that impression from the fact that Col. Deeds had stated that the planes had been shipped,. "because the question of shipment from Dayton to Hoboken had not come into his mind." McConaughy testified that before Capt. Sweetser and Pew had the conversation referred to, he himself had a conversation with Col. Deeds in which the latter had told him that the planes were on the water, and that he (McConaughy) repeated this statement to Pew and suggested that Pew interview Col. Deeds and write an article on the subject.

Tb evidence plainly establishes that McConaughy was anxious to get a news item about the planes which would tend to allay the public dissatisfaction with the lack of progress apparently being made. But no mention was made in the article which was written for publication of that feature which if true would have been the most important piece of news of all, to wit: that the planes were on the ocean. The omission of this item in "McConaughy Ex. 1," "McConaughy Ex. 2" and "McConaughy Ex. 3" is a pertinent fact to be considered in connection with the testimony of McConaughy and Pew, as contrasted with the testimony of Captain Sweetser, above recited, and that of Col. Deeds to the effect that he did not tell either McConaughy or Pew that the planes were on the ocean. Col. Deeds also denied having mntioned any particular number of planes in referring to those which were being shipped, although McConaughy and Pew testified that he mentioned the number 10 or 12 in this connection. That number was not referred to in the report as written up.

It may well be doubted whether Col. Deeds ever made any statement as to any particular number of planes or that any of them were actually on the water. It is possible that Pew, when he gave his testimony before Judge Hughes, had in mind what he had been told by McConaughy as coming from Col. Deeds on this subject.

The very unsatisfactory testimony in the case also leaves in the mind of the careful reader a very considerable degree of doubt whether Col. Deeds ever saw the second of paragraph of "McConaughy Ex. 2" which contained the language criticized by Judge Hughes in his report.

But if he did see it, and if he authorized it to be submitted to the Secretary of War for publication as claimed, it by no means follows that it was not believed by him to be true. McConaughy fixes the date of the interview between Captain Sweetser, Pew and Col. Deeds, as somewhere between the 10th and 14th of February. Pew says it was the 14th or 15th of February. Col. Deeds says that his information at the time of that interview was that four planes were then on the cars on their way to France; and that is as far as the information set forth in the second paragraph of the "McConaughy Ex. 2," "McConaughy Ex. 1" and "McConaughy Ex. 3" extends. There is nothing contained in the testimony taken at the inquiry or in any facts known to this office, to indicate that Colonel Deeds had any different information. The testimony shows that at least one plane had been shipped from Dayton on February 5th intended for foreign service, and that it reached Hoboken in two parts on February 26th and 28th. The telegram asking that it be recalled was not dated until February 14th. It must be remembered that while the statement was not published until February 21st, the conference with Col. Deeds had been held at least a week before its publication and perhaps more. Whatever statements Col. Deeds made were obviously made based upon his understanding of the condition of things as of that date, and could not have related to a changed situation which developed during the week or ten days succeeding.

In the affidavit submitted by Colonel Deeds which is forwarded herewith he says:

> "The facts are that the Dayton Wright Airplane Company, up to February 16, 1918, shipped four battle planes. Col. Deeds was informed and believed that those machines had been shipped from the factory to go to France. They are the machines referred to in the above statement. In his explanation before Judge Hughes, October 3, 1918, he made the following explanation:
>
> " 'I have only the explanation of the four planes about which I have just spoken. I had very definitely in my mind that there were a total of four planes that had been shipped, but I learned later that three of these had been diverted to Gerstner Field, but I did not know that at the time I looked over this. I made no statement that they were on the water, but that they were shipped.' "

It is recommended that no court-martial proceedings be instituted against Col. Deeds based upon this publication because: (1) it is doubtful whether he ever saw the paragraph which has been adversely criticized; and (2) the statements contained in it are in accord with what Col. Deeds apparently believed and had reasonable cause to believe to be the facts.

V

Testimony Before Senate Military Committee

It was stated further in the report of Judge Hughes that when Colonel Deeds was examined as a witness before the Committee on Military Affairs in the Senate on April 2, 1918, he was asked this question and gave this answer:

"Senator Wadsworth: Did you see or did you know whether any other responsible officers in your aviation section of the Signal Corps saw the statement given out by Secretary Baker on February 21, before it was published?

"Colonel Deeds: No, sir, I did not see it. I do not know of anybody seeing it." (P. 117.)

The report states that Colonel Deeds admitted giving this testimony, and that he testified that he did not then recall the paper in question. Judge Hughes, in his report, failed to set forth the remainder of Colonel Deeds' testimony as given by him before the Senate Committee.

Further consideration has been given the matter in the light of all the testimony of Colonel Deeds on the occasion in question.

The question that was asked Colonel Deeds by Senators Wadsworth referred to a statement given out by Secretary Baker on February 21, without particularly identifying the statement. Inasmuch as Colonel Deeds (as the record of the Hughes inquiry shows) had never seen Secretary Baker in regard to any statement which was to be given out on February 21, it is very natural that he should have replied that he did not see the statement. Up to that moment it does not appear that the particular statement in the mind of Senator Wadsworth had been called to Colonel Deeds' attention. Further questioning, however, elicited from Colonel Deeds information which showed that his negative answer to Senator Wadsworth's question had been given in perfectly good faith. When, immediately following the question referred to, he was asked by Senator Wadsworth whether he or any other officer of the Department consulted with Secretary Baker or with Mr. Creel before the Secretary authorized the statement, Colonel Deeds answered:

"No, sir, I did not see Mr. Creel. I did not see Mr. Creel until a few weeks ago. I had not met Mr. Creel up to that time. I knew that some one from the Bureau of Information came into the Chief Signal Officers' office and asked some questions, and the statement was made that we were behind production, but that according to the original arrangement, our planes were to be supplied up until July 1 from abroad, by France and Italy, and our planes were to follow, that while we were behind our schedule, at the same time we saw no reason why Pershing's forces would not be equipped because of this delay.

"Senator Wadsworth: You were present and overheard that conversation.

"Colonel Deeds: I remember a conversation just about like that that I had myself with someone from the Bureau of Public Information who came into the General's office along about that time.

"Senators Wadsworth: It was not Mr. Creel?

"Colonel Deeds: No, sir.

"Senator Wadsworth: Was it Mr. Ruhel?

"Colonel Deeds: No, sir.

"Senator Wadsworth: Was it Mr. Strunsky?

"Colonel Deeds: I do not know him.

"Senator Wadsworth: You cannot remember who it was?

"Colonel Deeds: I do not know.

"Senator Wadsworth: Was there anything to justify the statement that we were five months ahead of the program.

"Colonel Deeds: No, sir, not in what I said.

"Senator Wadsworth: Did any officer say anything to justify the statement?

"Colonel Deeds: No, sir."

None of the testimony quoted above appears in the Hughes report. It indicates that Colonel Deeds informed Senator Wadsworth at that hearing regarding the conversation with Mr. Pew the, details of which appear to have escaped his mind at the time. If, as a matter of fact, Colonel Deeds had not seen the second paragraph of "McConaughy Ex. 2" before publication, and did not state that the planes were then on the water, it is quite conceivable that without intending to make any false statement, he may have given the testimony he did in perfectly good faith, more especially as the statement itself, which was exhibited to him at the Sweetser-Pew interview, or was claimed to have been exhibited to him in typewritten form at that time, was not before him at the Senate investigation, as it subsequently was during the Hughes inquiry.

The following explanation by Colonel Deeds appears in his affidavit hereinabove referred to:

"As to Colonel Deeds testimony before the Committee on Military Affairs of the Senate on April 2, 1918, Colonel Deeds admitted giving that testimony, and explained at the time of his examination by Judge Hughes, and still asserts, that at the time he testified before the Senate Committee, he did not recall having seen the statement before the newspaper publication. The submission of the statement to him was only an incident in the rush of business, and at the time of the testimony before the Senate Committee, he had in mind publications in the newspapers, which had considerably elaborated upon the facts contained in the original decument. Between that time and the giving of his testimony in the Aircraft Inquiry, his recollection was refreshed by an investigation he made upon hearing that a witness who preceded him had been examined as to what extent Deeds was responsible for the statement. His testimony on each occasion, though there is a conflict, was entirely truthful, according to the recollection he had at the respective times. With the information that Colonel Deeds had at the time the statement was made, and which he believed to be true, there was nothing improper in the purpose or purport of the statement itself.

"The information Deeds had was not inconsistent with Talbott's telegram of February 14, 1918 (P. 117). The information was that the shipments had been made, one on February 11 and three on February 15. So the telegraphic reference on February 14 to one plane shipped was according to information. Talbott's reference to the first hundred remaining in this country was not official, nor did that happen."

In the light of the information now before this office, it is recommended that no proceedings before court-martial be instituted because of the statement made by Colonel Deeds before the Senate Committee, because the evidence does not show that he made a wilful false statement before that committee.

VI.

Packard Company Vouchers

The last transaction with which Colonel Deeds was connected, discussed in the memorandum submitted by this office on November 11, 1918, is the irregularity charged against him in approving two out of four vouchers in favor of the Packard Motor Car Company, these four vouchers aggregating $249,159.10. These acts of Colonel Deeds were not made the basis of any recommendation by Judge Hughes in his report, but were noticed by this office which made the statement in its previous memorandum that from the facts stated in the Hughes report it was impossible to say whether Colonel Deeds' act in this connection constituted a violation of any of the Army Regulations relating to money vouchers or such other breach of his official duty as to furnish the basis for charges against him.

Consideration to this subject has again been given in the light of the evidence disclosed upon the record of testimony taken before Judge Hughes and additional facts brought to the attention of this office.

One of the criticisms directed by Judge Hughes against this transaction is that there was no contract in writing with the Packard Motor Company covering this work. It is to be noted that the work was originally ordered at a time when Colonel Deeds was not in the Army; and the first voucher for payment on account which was approved by him was approved while he was acting as a civilian employee of the Government, for a yearly compensation of one dollar. The omission of a formal written contract, if Mr. Deeds was to blame for this at all, which is not clear from the record, is not attributable to him as an army officer. When he was called upon to approve the vouchers for payment the work was already in progress. With respect to Judge Hughes' criticism that no price had been fixed in advance, attention is invited to the following statements taken from a memorandum submitted to this office by Major E. A. Coleman, disbursing officer of the Bureau of Aircraft Production. The statements contained in that memorandum are supported by evidence taken before Judge Hughes:

"It is my understanding that the Aircraft Production Board secured the services of the Packard Motor Car Company to conduct certain experimental work in connection with the development of an airplane engine and to produce certain standardized engines, and that the Packard Company could not state in advance the cost of such experimental work, and that it was orally understood that the Signal Corps would reimburse the Packard Company their actual cost, plus a reasonable amount to cover administrative expenses, profits, etc. Before the delivery of the engines aforesaid covered by voucher No. 7228, it was agreed that certain definite unit prices would be paid therefor.

"These prices were arrived at, as I understand it, from estimates furnished by the Packard Company. In any event, the amount to be paid for such engines had been agreed upon by the Packard Company and by the representative of the Government, prior to the certification of the voucher.

"It is also my understanding that services of the Packard Motor Car Company were secured because it was considered that they were better equipped to handle this character of experimental work than other firms available for the purpose, under an emergency and stress of urgent public necessity that did not permit of delay, and that the methods employed to secure the services of this firm are authorized under orders dated April 12, 1917, signed by the Secretary of War. If I correctly understand the facts in this matter, the certificate executed by E. A. Deeds, Col. Signal Corps, on voucher No. 7228 of December, 1917, Captain H. Elliott's accounts, is regular and executed in conformity with the requirements of the regulations of the Signal Corps, literally true in all its essentials and justified by the facts."

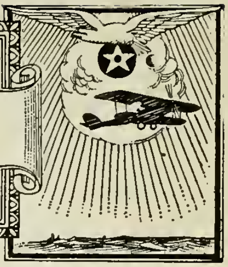
The Aircraft Production Board set aside an appropriation of $250,000.00 to cover the cost of the work. As the work progressed the Packard Company required money on account. Estimates were made of the amounts earned from time to time and four separate vouchers were made to cover all the payments to the Packard Company on this account. Only the third of this series was approved by Colonel Deeds while an officer of the army. That was dated December 6th, and was for $60,000.00. Up to that time two vouchers for $104,500 and $73,194.72 respectively, had been paid on account. The Packard Company had a complete record of all the transactions, and this record, while it does not appear to have been filed with the War Department, was gone over by Lieut. Colonel Vincent and used as the basis for payment. The Packard Company complained that it had lost money on the work.

Captain Oscar R. Ewing, of the contract section of the Bureau of Aircraft Production, testified that it was the custom of the service, on experimental work, sometimes to pay vouchers on a mere allotment of funds and an order, either verbal or in writing, against that allotment; but that these cases usually involved only small amounts.

Major General George O. Squier, Chief Signal Officer, testified that

(*Continued on page* 1050)

NAVAL *and* MILITARY AERONAUTICS



Key to Abbreviations

AAD—Assigned to active duty.
ABC—Report to Army Balloon School, Arcadia, Cal.
ABC—Report to Army Balloon School, Arcadia, Cal.
ADO—Report to Aviation Supply Depot, Dayton, Ohio.
ADT—Report to Aviation Supply Depot, Dallas, Texas.
AFO—Report to Aviation Supply Depot, Fairfield, O.
AGC—Report to Aviation Supply Depot, Garden City, L. I., N. Y.
AHT—Report to Aerial Gunnery School, Houston, Texas.
AIR—Transferred to the Air Service, National Army, without change in rank or date of commission.
ALF—Report to Camp Alfred Vail, Little Silver, N. J.
AMV—Report to Aviation General Supply Depot, Morrison, Va.
AOV—Report to School for Aerial Observers, Hampton, Va.
APR—Report to School of Aerial Photography, Rochester, N. Y.
ARV—Report to Aviation Supply Depot, Richmond, Va.
ASM—Report to Aviation Mechanics' Training School, St. Paul, Minn.
BFT—Report to Barron Field, Fort Worth, Texas.
BRN—Report to Bakers Field, Rochester, N. Y.
BST—Report to Brooks Field, San Antonio, Tex.
CAF—Report to Carlstrom Field, Arcadia, Fla.
CAP—Commissioned as Captain, Aviation Section, Signal Corps.
CDT—Report to Aviation Concentration Camp, Dallas, Texas.
CFT—Report to Carruthers Field, Fort Worth, Texas.
CGC—Report to Aviation Concentration Camp, Garden City, L. I., N. Y.
CGS—Report to Aviation Concentration Camp, Greenville, S. C.
CIT—Report to Radio School, Carnegie Institute of Technology, Pittsburgh, Pa.
CJS—Report to Camp Jackson, Columbia, S. C.
CJW—Report to Camp John Wise, San Antonio, Texas.
CLR—Commissioned as Colonel, Aviation Section, Signal Reserve Corps.
CMV—Report to Aviation Concentration Camp, Morrison, Va.
CPA—Commissioned as Captain Air Service, National Army.
CPR—Commissioned as Captain, Aviation Section, Signal Reserve Corps.
CRI—Report to Chanute Field, Rantoul, Ill.
CSO—Report to the Chief Signal Officer, Washington, D. C.
CUI—Report to School of Military Aeronautics, Cornell University, Ithaca, N. Y.
CWT—Report to Call Field, Wichita Falls, Texas
DAF—Report to Dorr Field, Arcadia, Fla.
DAP—Report to Director of Aircraft Production, Washington, D. C.
DIK—Report to Camp Dick, Dallas, Tex.
DIS—Honorably discharged from service.
DMA—Report to Director of Military Aeronautics, Washington, D. C.
ELA—Report to Eberts Field, Loanoke, Ark.
EOT—Report to Ellington Field, Olcott, Texas.
FLA—Commissioned as First Lieutenant Air Service, National Army.
FLR—Commissioned as First Lieutenant, Aviation Section, Signal Reserve Corps.
FLT—Commissioned as First Lieutenant, Aviation Section, Signal Corps.
FOB—Report to Fort Omaha Balloon School, Omaha, Neb.
FRF—On duty requiring regular and frequent aerial flights.
FSO—Report to Fort Sill School for Aerial Observers, Fort Sill, Okla.
GIT—Report to School of Military Aeronautics, Georgia Institute of Technology, Augusta, Ga.
GLC—Report to Gerstner Field, Lake Charles, La.
HHN—Report to Hazelhurst Field, Mineola, L. I., N. Y.
JMA—Rated as Junior Military Aviator.
JRC—Report to Jackson Field, Riverside, Cal.
KST—Report to Kelly Field, So. San Antonio, Tex. (When specified in the order, the number of the field is given in parentheses)
LDT—Report to Love Field, Dallas, Tex.
LHV—Report to Langley Field, Hampton, Va.
MAC—Report to March Field, Allesandro, Cal.
MAJ—Commissioned as Major, Aviation Section, Signal Corps.
MAT—Report to Mather Field, Sacramento, Cal.
MDO—Report to McCook Field, Dayton, Ohio.
MIA—Report to U. S. Naval Air Station, Miami, Fla.
MIT—Report to School of Military Aeronautics, Massachusetts Institute of Technology, Boston, Mass.
MJA—Commissioned as Major Air Service, National Army.
MJR—Commissioned as Major, Aviation Section, Signal Reserve Corps.
MSC—Report to Radio School, Maryland State Agricultural College, College Park, Md.
OBS—Attached to the Aeronautical Service as Observers.
OSU—Report to School of Military Aeronautics, Ohio State University, Columbus, Ohio.
PFO—Report to Post Field, Fort Sill, Okla.
PMT—Report to Park Field, Millington, Tenn.
PUP—Report to School of Military Aeronautics, Princeton University, Princeton, N. J.
PWM—Report to Payne Field, West Point, Miss.
REL—Relieved from present duty.
RSD—Report to Rockwell Field, San Diego, Cal.
RTR—Retransferred to organization attached to previous assignment to aviation duty.
RWT—Report to Rich Field, Waco, Tex.
SBI—Report to Scott Field, Belleville, Ill.
SAG—Report to Souther Field, Americus, Ga.
SGS—Report to Camp Sevier, Greenville, S. C.
SLA—Commissioned as Second Lieutenant Air Service, National Army.
SLR—Commissioned as Second Lieutenant, Aviation Section, Signal Reserve Corps.
SLT—Commissioned as Second Lieutenant, Aviation Section, Signal Corps.
SMA—Report to School of Military Aeronautics, Cambridge, Mass.
SMM—Report to Selfridge Field, Mount Clemens, Mich.
SRC—Report to Columbia School for Radio Officers, New York City.
TFT—Report to Taliaferro Field, Fort Worth, Texas. (When specified in the order, the number of the field is given in parentheses)
TMA—Report to Taylor Field, Montgomery, Ala.
UCB—Report to School of Military Aeronautics, University of California, Berkeley, Cal.
UIU—Report to School of Military Aeronautics, University of Illinois, Urbana, Ill.
UTA—Report to School of Military Aeronautics, University of Texas, Austin, Tex.
VBW—Report to Vancouver Barracks, Washington.
WAC—Report to Aviation Concentration Camp, Waco, Tex.
WCS—Wire to the Chief Signal Officer upon arrival.
WDM—Wire, Director of Military Aeronautics, upon arrival.
WFO—Report to Wilbur Wright Field, Fairfield, Ohio.

Notes

Note 1—Report to places mentioned in the order named.

Note 2—Report to Chicago, Ill., in connection with the aviation section of the Army.

Note 3—Report to Chicago, Ill., to District Manager Aircraft Finance.

Note 4—Report to Camp McClellan, Anniston, Ala, for duty with Balloon Detachment.

Note 5—Report to Middletown, Pa., to Aviation General Supply Depot.

Note 6—Report to 360 Madison Avenue, N. Y., to Dist. Mgr. Aircraft Finance.

Note 7—Report to Little Rock, Arkansas, and wire D. M. A.—Wash.

Note 8—Report to District Manager, Aircraft Finance, Buffalo, N. Y.

Note 9—Report to Akron, Ohio, and assume command as officer in charge of airship training and construction, and wire D. M. A.—Washington.

Note 10—Report to Pittsburgh, Pa., to Detach. No. 5, Bureau of Aircraft Production, Keenan Building, and wire D. A. P.—Washington.

Note 11—Report to Speedway, Indianapolis, Ind., to Aviation Repair Depot.

Note 12—Report to Cooperstown, N. Y., to commanding officer military hospital.

Note 13—Report to Boston, Mass., to Dist. Mgr. Finance, wire D. A. P.—Wash.

Note 14—Report to Army Balloon School, Lee Hall, Va.

Special Orders Nos. 13 to 20 Inclusive

A	
Amos, Frank H.	Note 2
Atwater, Allen R.	Note 6
Anable, Samuel	DMA
Archer, Cecil E.	UTA
Argo, Edwin Y.	PFO
B	
Bruton, Phillip G.	Note 10
Buchanan, Lester C.	UTA
Barry, John V.	DMA
Boyd, William P.	DMA
Beers, Donald	BFT
Brush, Oliver G.	PFO
Butts, John W.	SAG
Brockman, Ervin	BFT
Bingham, Hiram	DMA
Baker, Earle F.	LDT
Bulmer, Robert A.	EOT
Brelsford, William F.	EOT
Barber, Charles E.	Note 14
Brown, Sidney F.	RSD
Bennett, John James, Jr.	DIS
Blaney, John	BFT
Beverley, George H.	PMT
Benner, Harry M.	LDT
Barrett, Thomas A.	DMA
Bonham, John A.	SAG
Brooks, John B.	BFT
C	
Cohen, Harry R.	PFO
Corner, Paul R.	RSD
Cato, John H., Jr.	PFO
Collins, Lorin Cone	MIA
Creeden, Jeremiah J.	CAF
Church, Rollin S., Jr.	RSD
Clancy, John F.	KST
Coon, Sylvanus C.	RSD
Crissy, Dana H.	DMA
Carusi, Joseph S.	EOT
Cheston, Daniel M., Jr.	DMA
Cook, Philip P.	DMA
Caldwell, Ralph C.	ABC
Clevette, Charles F.	EOT
Cox, Gilbert H.	PMT
Connell, J. Weed	PMT
Clark, Harold L.	LDT
Claiborne, Harry C.	BFT
Collier, Herbert K.	KST
D	
Day, Clarence R.	Note 7
Duncan, Thomas	CAF
Deuel, Thorne	CAF
Doyle, Benton Arthur	BFT
Decker, Harold J.	PMT
Deere, Gilbert D.	DMA
Davies, Ward J.	RSD
Doane, Samuel E.	EOT
E	
Eubank, Eugene L.	EOT
Eidson, Charles G.	MDO
F	
Force, Ernest W.	EOT
Fournier, Paul	LHV

Foster, James H	RSD
Fickel, Jacoh E	DMA
Fleet, Reuhen H	MDO
Felt, Lee W	PFO

G

Goldblatt, Benni	Note 6
Garrison, William H., Jr	Note 5
Given, Richard Alexander	Note 3
Gribble, Frederick C	Note 8
Giffin, James L	CAF
Greenwalt, Henry S	CAF
Gardner, William A	BFT
Gunn, Malcolm B	FRF
Goddard, George W., Jr	CAF
Graham, Harry	DMA
Godtrey, John S	ARV
Galt, John M	DMA

H

Hoskins, Cedric	EOT
Harding, Claude L	KST
Hamor, Bert L	Note 5
Hensley, William N	Note 9
Hines, Carter E	KST
Horton, Clarence F	DMA
Humphreys, Frederic	MDO
Hiller, Melvin E	BFT
Horning, Clare A	MAC
Haynes, Grissom E	CGC
Hochreiter, Charles J	KST
Hyndshaw, Silas C	KST
Howeth, Woodfin Grady	LDT
Hunter, Thomas O	LDT
Hine, William H	BFT
Hillery, Edward A	EOT
Holland, Park	KST
House, Taylor N	RSD
Hickey, Doyle O	PFO
Huston, Paul W	BFT
Hearne, Francis H	CAF

I

Ison, Nathaniel B	EOT
Ilgenfritz, Frank W	KST
Immel, Paul P	DMA

J

Johnson, Frederick A	CAF
Johnston, Samuel	Note 13
Johnson, Luther H	DMA

K

Kokjer, Thomas E	KST
Kalis, Samuel H	SAG
Knode, Thomas E	BFT
Kohn, Edwin R	RSD
Krause, James W	BFT

L

Largent, Ralph N	RSD
Lewis, James O	PMT
Londrigan, Joseph A	KST
Lokey, Thomas E	KST
Little, James C	KST

M

Moore, James F	Note 12
Mowry, James B	EOT
Matthews, Chauncey W	RSD
Mann, Asa O	PMT
Manzelman, Earle H	PMT
Marsh, Ian D	BFT
Metcalf, Herbert E	DMA
Minter, Hugh C	KST
Masson, Charles A	BFT

Mc

McRae, John	PMT
McInerney, John	DMA
McLaurin, King H	DMA
McDowell, Lamont A	EOT
McGregor, Kenneth C	BFT
McHenry, Lorin H	EOT
McDowall, John	PFO

N

Nixon, John F	PFO
Newton, Littleton Alexander	BFT
Newbold, Edwin E	PMT
Nolde, Fred F	DMA

P

Peyton, Tom L	PFO
Pitts, J. E	PFO
Pinkham, William D	RSD
Page, Frank H	EOT
Palmer, Claude N	Note 3
Powell, John W	CAF
Potts, Thomas R	CAF
Pollock, Gordon B	MAC
Puryear, George W	RSD

Q

Queal, William N	AGC
Quarles, Robert E	PFO

R

Roddy, Norman L	KST
Ravenscroft, Charles F	DMA
Rogers, George H	RSD
Rossell, John E	MAC
Rogers, George Washington	PMT
Ridgely, Arthur O	Note 4
Roup, Glenn M	KST

S

Shovlin, Hubert A	KST
Sillars, Alexander Graham	KST
Simon, Harry E	EOT
Stiven, Charles E	EOT
Sizer, Theodore	DMA
Spencer, Raymond C	EOT
Spicer, John H	KST
Snow, Lorenzo L	MDO
Stewart, James E	DMA
Sohm, Elbert G	KST
Schumacher, Edward	ABC
Stimson, George W	Note 11
Rogers, Oscar L	RSD
Slate, Everett J., Jr	KST
Scott, James Marvin	Note 8
Sundeen, Martin A	KST

T

Taylor, Lloyd W	CAF
Taylor, Robert D	KST
Taylor, Charles R	PFO
Towle, Francis B	RSD
Thomas, Harold S	CGC
Tate, Bertram B	RSD

V

Vickers, Edward W	Note 12
Vollmer, William H	DMA
VanMeter, Solomon L., Jr	KST
Van Pittman, Wayne	EOT
Van Horn, Harry A	DMA

W

Wilbur, Jesse B	KST
Wuest, Jacob W. S	JMA
Williams, Paul L	RSD
Williams, Rogers Q	CAF
Welsh, William J	CAF
Watson, Arthur G	KST
Willcox, Albert M	BFT
Wolfe, Kenneth B	PMT
Wright, Wilbur A	RSD
Westall, William H	BFT
Wood, Glen E	KST
Wiggins, Frederick C	DMA
Wing, Charles R	RSD

General Lee Returns Home

Brigadier General Charles Frederick Lee, R. A. F., Chief of the British Aviation Mission, sails for England on the "Adriatic," February 8th. Following his service with the British Expeditionary Force in 1914, 1915 and 1916, General Lee returned to England to command the Training Brigade, R. F. C. He joined the British Mission to the United States on November 30, 1917, as officer commanding the Aviation Mission. His home is Grove Hall, Knottingley, Yorks, England.

Italian Service Ribbons to American Airmen

Forty-eight officers of the Air Service and one officer of the Medical Reserve Corps detailed to the Air Service have been authorized by the Italian Minister of War to wear the Italian Service Ribbon, instituted by Royal Decree 641 May 21, 1918, according to a communication from the Chief of the Air Service, A. E. F. The officers named have returned to the United States and so their official certificates from the Italian Government have been sent to the Division of Military Aeronautics for distribution.

The names and home addresses of the officers follow: Captains: Edmund A. Kruss, San Diego, Calif.; Oliver B. Kiel, (Medical Reserve Corps) no address. First Lieutenants: Lawrence N. Campbell, Owatorma, Minn.; Wallace H. Carpenter, Duluth, Minn.; Robert P. Clarke, Jr., Sewickley, Pa.; Leman O. Conley, Penn Yan, N. Y.; Frederick G. Dodge, Genesee, N. Y.; Ross R. Dunn, Noblesville, Indiana; Horace Drever, Philadelphia, Pa.; Thomas F. Fielder, Spartansburg, S. C.; Bicknell Hall, Jr., Taunton, Mass.; George S. McKey, (MacKey) Chicago, Ill.; Edward B. Mayer, Iowa City, Iowa; Edward M. Malley, Greensburg, Pa.; Willard S. McKay, Plainfield, N. J.; Edward M. Ogden, Rochester, N. Y.; Charles P. Penney, Buffalo, N. Y.; David S. Pruitt, Bethany Beach, Del.; Earl D. Ranck, Overbrook, Pa.; Samuel S. Robinson, no address; Lawrence G. Sherman, Brattleboro, Vt.; Horace L. Stevenson, 157 U St., Washington, D. C.; Oliver H. Stout, Indianapolis, Ind.; Verlie Van Zele, Genesse, Ill.; Paul J. Wedel, Jersey City, N. J.; George O. Wright, Fort Valley, Ga.; Linus V. Windnagle, Portland, Oregon; William P. Young, Clearfield, Pa.; Clarence M. Young, Des Moines, Iowa; Walter T. Mayer (Meyer), Columbus, Ohio; Walter M. Boadway, Princeton, N. J.; Lester B. Cowgill, no address; Hugh D. Stier (Stark), Pittsburgh, Pa.; George N. Nyland (Hyland), Philadelphia, Pa.; John N. Devoe, no address; Frank C. Cox, no address. Second Lieutenants: Paul H. Cresswell, Cedarville, Ohio; William J. Flynn, Detroit, Mich.; Hugh J. Gaffney, Jersey City, N. J.; Richard Goodman, Philadelphia, Pa.; William M. Malcolm, Hartford, Conn.; Thomas J. Mitchie, no address; Raymond W. T. Ricker, New Durham, N. H.; Herman Schmidt, 2813 N. Cap., Washington, D. C.; Horace S. Stevens, no address; John A. Posy, no address; Lawrence D. Messner, Wilkinsburg, no address; Lawrence J. Joseph, Galveston, Texas; John W. Canon, no address.

Official Publications for Flight Surgeons

Three interesting and instructive publications on the medical side of flying prepared hy members of the Air Service, Medical, are now in press.

The first of these pamphlets will appear under the title "The Air Service, Medical Manual." It will comprise four chapters concerning the conservation of human material, as well as the conservation of machines as developed in practice in the U. S. Air Service. The development of the "Trouble-shooter" of the flier as compared to the trouble-shooter of engines and machines was developed in the person of the "flight surgeon."

The second publication is more general in character and also more extensive. It is issued under the title, "Air Service, Medical," and comprises 500 pages of text with 275 full-page illustrations. It is a story on the general standpoint of the medical aspect of aviation from Langley's experiments to the Aeronautical achievements of the present day. It is the doctor who makes flying safer, through selection, classification and maintenance of the fliers. Under the last sub-division are explained the duties of the physical director and nutrition officer.

The third publication is more technical and deals with the internal working of the medical research laboratory established for the Air Service at Mineola, L. I.

A group of aeronautic enthusiasts at Wilbur Wright Field. Second from the right, standing, is Col. J. G. Vincent, and kneeling at the right, Walter E. Lees, pioneer aviator

FOREIGN NEWS

Polish Air Service

In its stand against the Bolsheviki Poland is handicapped by lack of adequate air service, there being only fourteen old training planes available. Efforts are being made to purchase planes in Vienna and it is reported that the United States Government has dispatched several planes for the use of the Polish Army.

British Lift Experiment Ban

The Ministry of Munitions has suspended the regulation prohibiting the experimental manufacture without license of any aeroplane, seaplane, or any aero engine or part thereof. This order prohibited even the making of detail drawings. Lumber may again be bought and sold without license.

The priority for many uncompleted war contracts has been lifted, permitting firms to accept orders for peace business and give them priority over war contracts.

The whole industry will welcome this return to peace conditions and development of commercial aircraft can proceed unhindered by Government regulation. The commendable foresight of the Ministry of Munitions in restoring peace conditions as rapidly as possible may tend to influence American policy.

French Distribute Food By Aeroplane

In certain districts in Northern France the Germans, in their retreat, so thoroughly destroyed the bridges and railways as to render the delivery of food supply highly difficult. The French Government has decided to use aeroplanes for the purpose.

Germany Plans to Dominate Swedish Aircraft Market

German aircraft companies, immediately following the signing of the armistice, sent several of the latest type of twin-motored planes to Stockholm, with a view to capturing the Swedish market. Trial flights are frequently made and the machines offered at tempting prices.

It is suggested that Allied and American manufacturers make an effort to secure a part of this prospective trade, as the opportunities are excellent. Sheltered by numerous islands and inlets, there should be a lively demand for seaplanes.

Air Transportation in China

Owing to the difficulty which would be encountered in the transportation of materials for the erection of three commercial wireless stations in remote parts of China, the Marconi Company has arranged with Mr. Handley Page for their delivery by aeroplanes. No part of the machinery to be used will weigh more than 300 pounds. By ordinary methods of transportation it would take two to three months to convey the radio instruments across China as against the same number of days by aircraft.

British Seek Air Route Concession in Brazil

Rio de Janeiro, January 21.—A British aeronautic concern has requested a concession to establish an air route between Rio de Janeiro and Pernambuco. It is intended to extend the system to Buenos Ayres.

Royal Air Force Lose Polo Championship

By sustaining a 13½ to 8 defeat on January 22nd at the hands of the White Owls the Royal Air Force lost its chance of winning the Victory Cup for the Canadian polo championship.

British Companies to Insure Aviators

According to a statement of an important official of a large British insurance company, it is quite probable that insurance companies will write life insurance for aviators. At the present time insurance is not unobtainable, but companies will not pay on policies or return premiums paid if the flying accident occurs within three years of issuance of policy.

A French Nieuport Scout

Canada Plans Aerial Development

Coincident with the announcement of the British civil committee of the Air Board proposing interimperial aerial scheme, the Canadian civil authorities have also taken up the matter along national lines. With this object in view representatives from the various centres of the Dominion have already consulted the Federal Cabinet, with the result that earnest consideration will be given to the question of future aviation in Canada. One of the suggestions discussed at the Ottawa conference was the establishment of a national aeronautical advisory committee for the purpose of going into the whole matter exhaustively. E. W. Beatty, president of the Canadian Pacific Railway, was named president of the committee. Mr. Beatty, who is only 41 years of age, recently succeeded Baron Shaughnessy as president of the C. P. R. Mr. Beatty is a King's Counsel and reached his present high position after seventeen years of hard work with the railway.

International Laws of the Air

An Inter-Allied Aeronautical Conference will be held at Paris in the spring of 1919 for the purpose of establishing International Law for aircraft. It is probable that pilots will be required to carry passports, and when crossing from one country to another will be obliged to stop at designated fields for identification and customs inspection.

Arrivals at the International Aerodromes will be entitled to the latest meteorological information and directions regarding the cross-country air routes.

Certain areas will be banned for the aerial traveller for military reasons.

Lord Weir On Commercial Aeronautics

Manchester.—In discussing the future of commercial aeronautics, Lord Weir, Secretary of State for the Royal Air Force, stated that its success would be largely dependent upon the development of the science of aerial navigation; the careful and thorough training of aerial navigators; the perfection of navigating instruments; the organization of an extensive meteorological service; the adoption of standardized night and day marking of landing fields, and the employment of radio telegraphy and telephony for communications. These factors will contribute to the safety and reliability of commercial navigation and their development has not kept pace with that of design and construction of commercial aeroplanes.

Lord Weir is opposed to government monopoly of aerial transport. He urged the permanent acquisition of all military aviation fields in order that they may be made available for commercial travel.

Air Route to Far East

Melbourne, Australia, January 22.—The Australian Government, it is announced, has sanctioned the formation of a company to survey an aerial route between Australia and the Far East.

British Air Force Had 294,000 Officers and Men

London, Jan. 23.—Great Britain was pre-eminent in aviation at the close of the war, when her air force was the largest in the world, according to a report made public recently. It fought on more fronts than the air service of any other nation in the war.

In August, 1914, the British naval and military air services together mustered only 285 officers and 1,853 men of other ranks. In November, 1918, there were 30,000 officers and 264,000 men. At the outbreak of the war Great Britain had 166 aeroplanes, forty-five seaplanes, and seven airships, while at the close of hostilities she had 21,000 aeroplanes, 1,300 seaplanes, and 103 airships. Besides this there were 25,000 aeroplanes and seaplanes being built and 55,000 aeroplane engines under contract.

The Women's Royal Air Force, which was not in existence in 1914, numbered at the close of the hostilities 23,000.

New Italian Speed Record

Rome, Jan. 24.—A new Italian biplane, the Marchetti Vickers Terni, piloted by Sergeant Elia Lint, has attained under official trials an average certified speed of 160 miles an hour.

The trials were conducted at a height of nearly a hundred feet from the ground, so the controls were flattened in flight, and the flights were made both with and against the wind.

The motor was of the 200 horsepower Spa type. The average speed attained exceeds by sixteen miles the previous record under similar conditions.

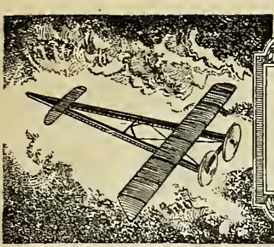
Italian "White Eagle" for Ocean Flight

London.—The correspondent of *The Daily Telegraph* at Milan reports that Signor Caproni has nearly finished the gigantic machine in which it is intended to fly from Italy to America. The machine is a huge triplane with engines of 3,000 horsepower and ample accommodation for a certain number of passengers, for whom cabins and sleeping berths will be available.

The Caproni transatlantic flier is to be named the White Eagle, in allusion to a curious prophecy printed here in 1916 and attributed to an English friar of the seventeen century. The prophecy announced that there would be a great world war in the twentieth century, which would be started by the evil genius of an Emperor in Luther's country in league with another Emperor, both of whom had black eagles on their coats of arms, but that civilization would eventually crush the barbarians, whose empires would be divided up into twenty-two States.

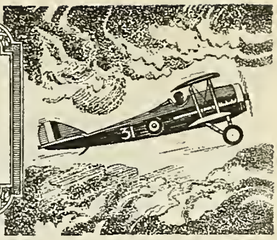
The white eagle in phophecy is interpreted to be the American eagle. Verses on the subject, written by a local poet, W. Lewis, and set to music, were presented, with a beautiful design drawn by two Italian artists in gold and colors, to President Wilson when he was in Milan. It was on seeing this design and poem that Caproni decided on the name for his machine.

It is proposed that the aviators take the same route as Columbus did, flying from Italy to Cadiz and the Azores and thence to the American coast and landing near Washington.



ELEMENTARY AERONAUTICS *and* MODEL NOTES

By John F. McMahon



Model Aeroplane Building as a Step to Aeronautical Engineering

WE will now proceed to check up the possible performances of our machine.

Our first problem is to correctly ascertain the wing resistance at the different speeds. Now the reader will notice that the wing resistance is high at low speeds due to the larger angle of incidence necessary to fly at low speeds. (The reader will remember that to fly at certain speeds we can alter the area, speed, or angle of the planes.) We cannot change the area in flight and we wish to fly at a low speed so we simply alter the incidence by pulling back the control stick and lowering the tail until the correct angle for minimum speed is reached. For the R. A. F. 6 section this occurs at 16 degrees when the lift coefficient is highest.

By consulting the accompanying chart we will see that the resistance is also high due to the greater area presented to the wind. When checking up the performance of a machine the parasite or non-lifting resistance is figured separate to the wing resistance and you will notice that at low speeds the parasite resistance is small and gradually increases with the speed, while the wing resistance is high at low speeds owing to the large angle of incidence and as the speed increases the angle becomes less and of course the resistance comes down and then it starts to climb again as the aeroplane begins to get into high speed.

The resistance coefficient at 16 derees is .000446 then our wings will have a resistance of

coefficient surface M.P.H.

$.000446 \times 206 \times 37^2 = 126$ lbs. approx.

But as the speed increases the angle grows less and we find that at the maximum speed of 60 M.P.H. we will use an angle at which the wings are set on the aeroplane which is 4½ degrees.

The resistance coefficient at 4½ degrees is about .000102 then at 60 M.P.H. our wings will have a resistance of only

coefficient surface M.P.H.

$.000102 \times 206 \times 60^2 = 75$ lbs. approx.

The reader will see that the resistance of the wing is much higher at the lower speed than at the higher.

Now the coefficient of resistance of a radiator is .00173 and we have approximately 2 sq. ft.

$.00173 \times 2 \times 37^2 = 4.7$ lbs.
$.00173 \times 2 \times 60^2 = 12.46$ lbs.

Now the skin friction of a body is regarded as .03 per sq. ft. at 60 M.P.H. and .0114 at 37 M.P.H. We have a surface on the body of approximately 90 sq. ft., then the skin friction at 37 M.P.H. will be $.0114 \times 90 = 1.03$ lbs. and at 60 M.P.H. it is $.03 \times 90 = 2.7$ lbs. this, of course, is neglecting the hole in the cockpit and the aviator's head. It would be fair to add 2 lbs. at 37 M.P.H. and 5 lbs. at 60 M.P.H. for this which would bring the body resistance up to

	37 M.P.H.	60 M.P.H.
Radiator	4.7	12.46
Skin Friction	1.03	2.7
Resistance of Cockpit and head	2.00	5.00
Total	7.73 lbs.	20.16 lbs.

This resistance due to the slip stream of the propeller is increased 25% which makes these resistances 9.66 lbs. and 25.2 lbs.

We have 42 feet of struts and the resistance 12.8 lbs. per 100 feet of strut at 60 M.P.H. The struts then have a resistance of $\frac{42 \times 128}{100} = 5.38$ lbs. at 60 M.P.H. and 2.05 lbs. at 37 M.P.H.

Wheels have a resistance of about 1½ lbs. each at 60 M.P.H. that is if they are covered with cloth or metal to make a streamline shape. Two wheels would be 3 lbs.

The landing chassis, struts, axle, etc., have a resistance of 5 lbs. at 60 M.P.H.

The rudder, tail, etc., have a resistance of 3 lbs. at 60 M.P.H. This is increased 25% owing to the slip stream of the propeller which increases this to 3.75 lbs. at 60 M.P.H.

The wires, control arms, fittings, etc., add another 3 lbs. Our parasite resistance is then

Body	25.2 lbs.
Struts	5.38
Wheels	3.
Landing Chassis	5.
Rudder, etc.	3.75
Incidentals	3.
Total	45.33 lbs. for the body at 60 M.P.H.

At 37 M.P.H. this resistance would be

$37^2 : \times : : 60^2 : 45.33$ lb. = 13 lbs. approx.

Our total resistance is then

Wings	37 M.P.H.	126 lbs.
Parasite	37 M.P.H.	13 lbs.
		139 lbs.

Horsepower required is

$$\frac{139 \times 37}{375} = 13.7 \text{ Horse Power required}$$

Wings	60 M.P.H.	75 lbs.
Parasite	60 M.P.H.	45.33 lbs.
		120.33 lbs.

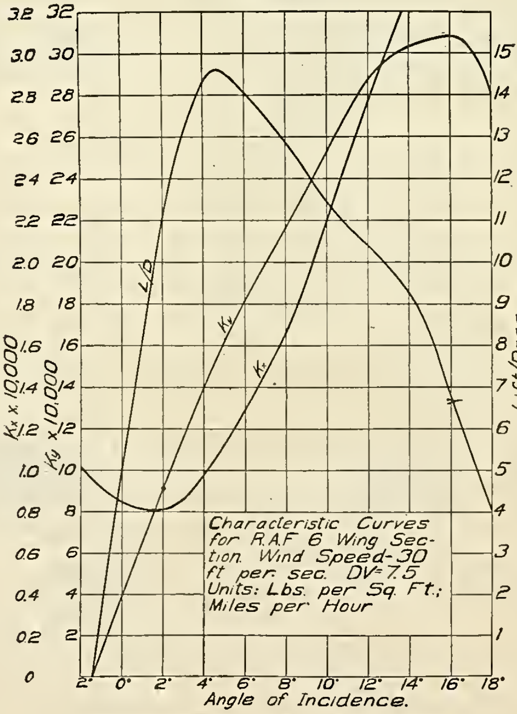
Horse Power required

$$\frac{120\text{-}1/3 \times 60}{375} = 19\tfrac{1}{4} \text{ horse power required approx.}$$

Of course this is the actual horse power. The propeller slips 25% so we must develop 25% more horse power to give the horse power required at the propeller. This will increase our figures to 17.1 H.P. and 24.06 H.P.

A re-designed Ford motor will develop from 30 to 35 horse power so the reader will readily see that we will have a reserve horse power of from 5 to 10 for climbing.

(*To be continued*)



Characteristic curves for R.A.F. 6 wing section

Aeronitis is a pleasant, a decidedly infectious ailment, which makes its victims "flighty," mentally and physically. At times it has a pathologic, at times merely a psychologic foundation. It already has affected thousands; it will get the rest of the world in time. Its symptoms vary in each case and each victim has a different story to tell. When you finish this column YOU may be infected, and may have a story all of your own. If so, your contribution will be welcomed by your fellow AERONUTS. Initials of contributor will be printed when requested.

Says Wifey to Hubby

Harry, how I used to kid you
  On our fleeting honeymoon;
When I asked you, sweetheart, did you
  Have another girl to spoon.

How my habit was to tease you,
  Saying "when away from home
Will some other woman squeeze you,
  And will yours o'er strange lips roam?"

How I tossed my foolish banter,
  Saying that I'd trust you,
Boy, forget it, please don't canter,
  O'er green fields and pastures new.

Husband, dear, I have but just you,
  Even if I did, in fun,
Say abroad I would not trust you
  If you met a pretty one.

Now I lie awake and wonder
  What you're doing over there,
Hoping, dear, that you won't blunder
  From the Straight Path is my prayer.

Harry, dear, I worry daily
  While you're there among the French,
Wondering if you're playing gaily
  With some charming brunette wench.

Lonesome! Sweetheart, how I miss you,
  But, with patience, wait I must
For the day when I can kiss you,
  Seems as though my heart would bust.

Says Hubby to Wifey

Dearest, all your prayers and wishes
  I have pasted in my hat;
I'll not taste forbidden dishes,
  And we'll let it go at that.

But, dear, whilst you're moralizing
  On my conduct over here,
Save your brown eyes tantalizing,
  Glances for your husband dear.

All my days are full and busy,
  While my sweetheart sadly waits;
Sometimes, dear, my brain grows dizzy,
  Wond'ring if you're making dates.

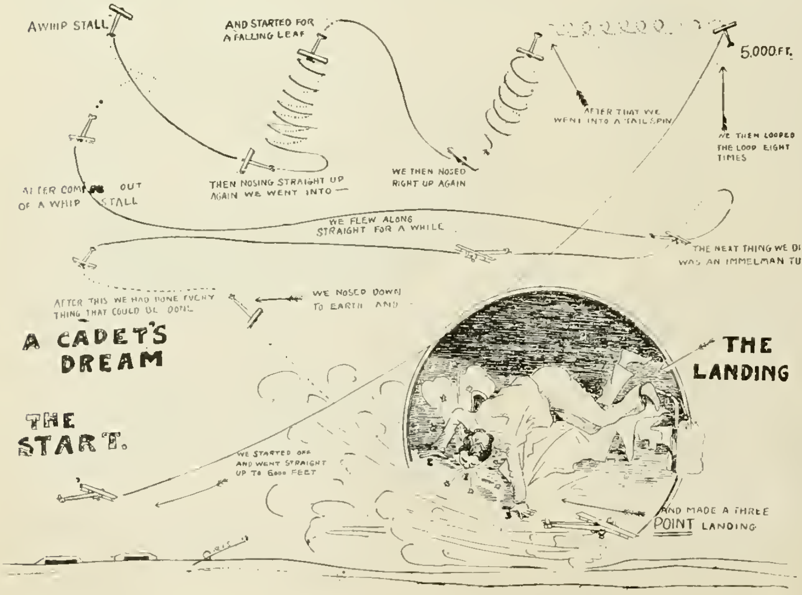
And while you're praying and pleading
  For my welfare over here,
Don't let anyone be leading
  You from the straight and narrow, dear

Satan always finds employment
  For small hands with nought to do;
If you brood o'er my enjoyment
  He may find a job for you.

You have asked me not to frolic
  In green fields and pastures new;
To abstain from sports bucolic,
  Likewise, love, is good for you.

And dear heart, until I meet you,
  When I step down from the ship.
And with loving kiss I greet you,
  Look out, dear, YOUR foot don't slip.

—Bard of Beaumont.

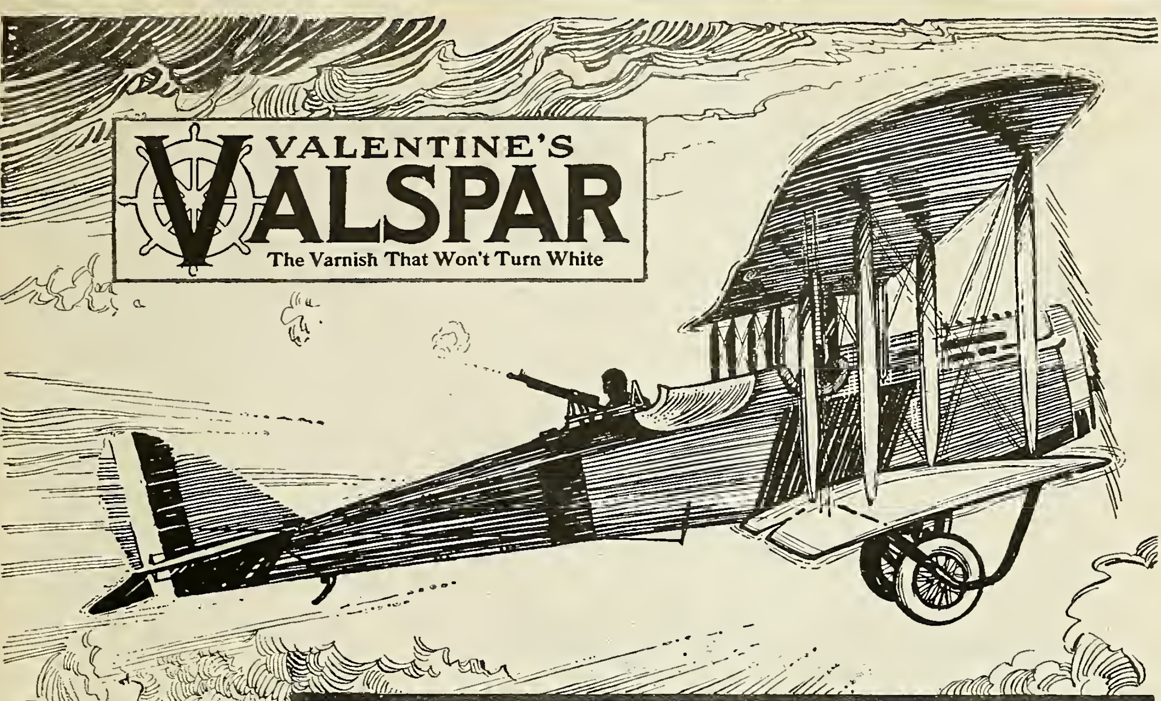

A WHIP STALL
AND STARTED FOR A FALLING LEAF
THEN NOSING STRAIGHT UP AGAIN WE WENT INTO —
WE THEN NOSED RIGHT UP AGAIN
AFTER THAT WE WENT INTO A TAILSPIN
5.000 FT.
WE THEN LOOPED THE LOOP EIGHT TIMES
AFTER COMING OUT OF A WHIP STALL
WE FLEW ALONG STRAIGHT FOR A WHILE
THE NEXT THING WE DID WAS AN IMMELMAN TURN
AFTER THIS WE HAD DONE EVERY THING THAT COULD BE DONE
WE NOSED DOWN TO EARTH AND
A CADET'S DREAM
THE LANDING
THE START.
WE STARTED OFF AND WENT STRAIGHT UP TO 6000 FEET
AND MADE A THREE POINT LANDING

—From The Fly Leaf.

A Marine's Ride

(From the "Globe and Anchor," Galveston.)

THE OTHER DAY
I WENT UP
TO ELLINGTON FIELD
TO GIVE THE PLACE THE O. O.
AND THEY WERE AWFULLY POLITE
AND ASKED ME
IF I WANTED TO GO UP
AND I TOLD THEM I DID
SO THEY GAVE ME
ONE OF THESE
CUTE LITTLE COATS
THAT ALL THE HEROES
ON THE MAGAZINE COVERS
WEAR
AND ONE OF THESE
HELMETS
TO KEEP MY HAIR
AND EARS
FROM BLOWING OFF
AND SOME GOGGLES
AND THEY STRAPPED ME IN
WITH A SIX-INCH STRAP
AND I WONDERED
AT THE TIME
WHY IT WAS SO WIDE
AND LATER
L FOUND OUT.
WELL
THE PILOT
WHO WAS HELPING ME
TO NEED MY INSURANCE
WAS LIEUTENANT EDDIE PACK
AND BEFORE WE STARTED
THEY TOLD HIM
TO GO EASY
AND SO DID I
AND HE SAID HE WOULD.
AND WE STARTED
AND THE NEXT THING
I KNEW
THE GROUND WAS FAR AWAY
THAT IT WAS
A NEGLIGIBLE QUANTITY
AND PRETTY SOON
I NOTICED A LITTLE DIAL
IN FRONT OF ME
AND ON IT
IT SAID
"8 THOUSANDS OF FEET."
BUT THAT
WAS SUPERFLUOUS
I KNEW IT.
AND OF A SUDDEN
WE WERE HEADED
FOR THE GROUND
AT A COUPLE OF MILLION
MILES PER HOUR
AND THEN WE WERE
HEADED FOR HEAVEN
AT THE SAME RATE
AND WHEN I LOOKED UP
TO SEE IF WE HAD HIT
THE SKY YET
INSTEAD OF THE SKY
I SAW THE GROUND
AND WHEN I LOOKED DOWN
I SAW THE SKY
AND IT WAS THEN
THAT I OFFERED UP
A SILENT PRAYER
FOR THE STRAP
ABOUT MY MIDDLE.
AND ABOUT THAT TIME
WE PASSED A CROW
AND HE HAD
AN ENVIOUS LOOK
IN HIS EYE
BECAUSE EVEN HE
COULDN'T FLY
WITH HIS FEET
POINTED HEAVENWARD
AND ALL I CAN SAY
IS
IF LIEUTENANT PACK THINKS
WHAT HE DID
WAS "GOING EASY"
I WANT TO BE
ANCHORED TO THE GROUND
WHEN HE
EXERTS HIMSELF.
FINIS.


VALENTINE'S
VALSPAR
The Varnish That Won't Turn White

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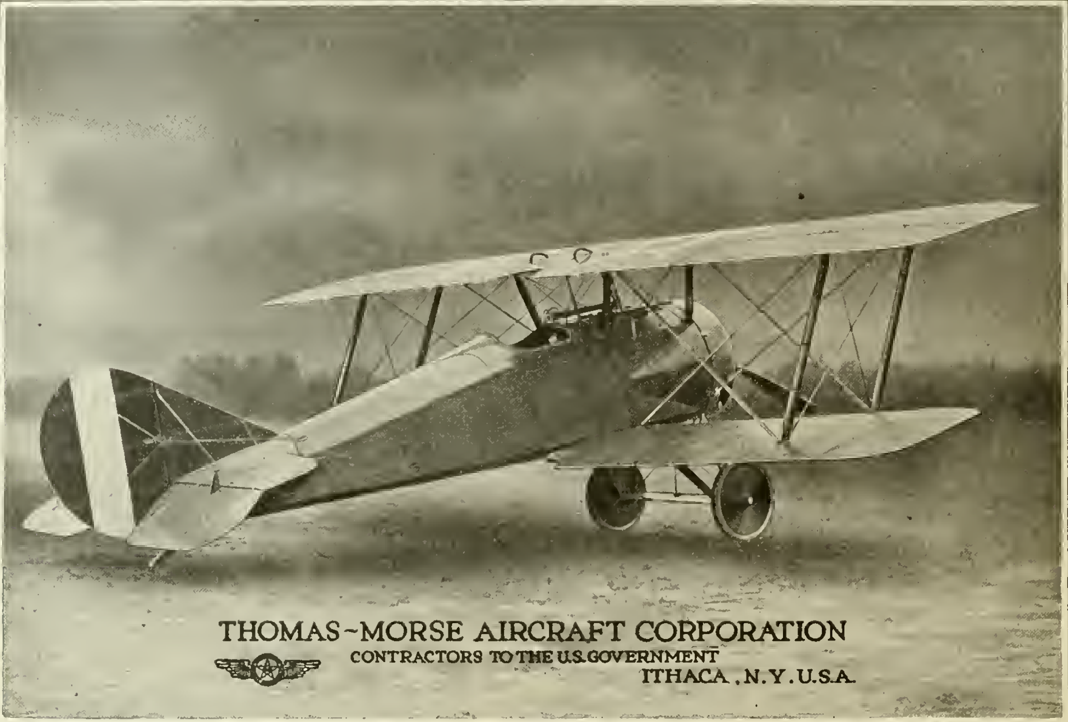

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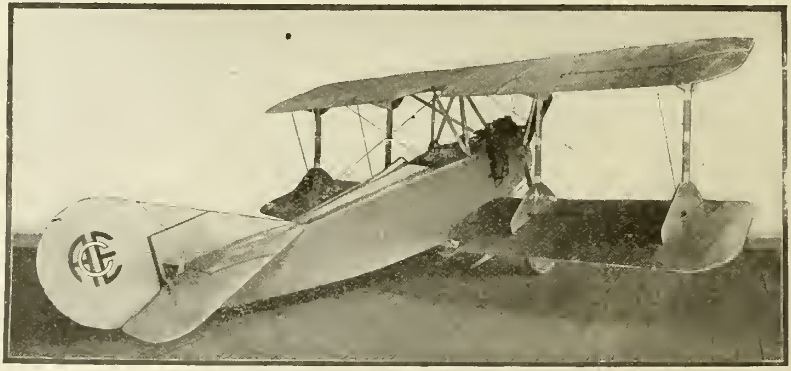

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The Secret of Being a Convincing Talker

How I Learned It in One Evening

By GEORGE RAYMOND

"HAVE you heard the news about Frank Jordan?"

This question quickly brought me to the little group which had gathered in the center of the office. Jordan and I had started with the Great Eastern Machinery Co., within a month of each other, four years ago. A year ago Jordan was taken into the accounting division and I was sent out as salesman. Neither of us was blessed with an unusual degree of brilliancy, but we "got by" in our new jobs well enough to hold them.

Imagine my amazement, then, when I heard:

"Jordan's just been made Treasurer of the Company!"

I could hardly believe my ears. But there was the "Notice to Employees" on the bulletin board, telling about Jordan's good fortune.

Now I knew that Jordan was a capable fellow, quiet, and unassuming, but I never would have picked him for any such sudden rise. I knew too that the Treasurer of the Great Eastern had to be a big man, and I wondered how in the world Jordan landed the place.

The first chance I got, I walked into Jordan's new office, and after congratulating him warmly, I asked him to let me "in" on the details of how he jumped ahead so quickly. His story is so intensely interesting that I am going to repeat it as closely as I remember:

FREDERICK HOUK LAW

As educator, lecturer, executive, traveler and author few men are so well equipped by experience and training as Dr. Law to teach the art of effective speaking. His "Mastery of Speech" is the fruit of 20 years active lecturing and instruction in Eastern schools and colleges preceded by an education at Oxford Academy, Amherst College, Columbia University, The Teachers' College, Brown University and New York University. He holds the degrees of A. B., A. M. and Ph. D.

Dr. Law is the author of two novels, two books of poetry, and editor of six school textbooks. At present he is lecturer in English in New York University. Lecturer in Pedagogy in the Extension Work of the College of the City of New York, Head of the Dept. of English in the Stuyvesant High School and writer of the Weekly Lesson Plans for The Independent.

"I'll tell you just how it happened, George, because you may pick up a pointer or two that will help *you*.

"You remember how scared I used to be whenever I had to talk to the chief? You remember how you used to tell me that every time I opened my mouth I put my foot into it, meaning of course that every time I spoke I got into trouble? You remember when Ralph Sinton left to take charge of the Western office and I was asked to present him with the loving cup the boys gave him, how flustered I was and how I couldn't say a word because there were people around? You remember how confused I used to be every time I met new people? I couldn't say what I wanted to say when I wanted to say it; and I determined that if there was any possible chance to learn how to talk I was going to do it.

"The first thing I did was to buy a number of books on public speaking, but they seemed to be meant for those who wanted to become orators, whereas what I wanted to learn was not only how to speak in public but how to speak to individuals under various conditions in business and social life.

"A few weeks later, just as I was about to give up hope of ever learning how to talk interestingly, I read an announcement stating that Dr. Frederick Houk Law of New York University had just completed a new course in business talking and public speaking entitled 'Mastery of Speech.' The course was offered on approval without money in advance, so since I had nothing whatever to lose by examining the lessons, I sent for them and in a few days they arrived. I glanced through the entire eight lessons, reading the headings and a few paragraphs here and there, and in about an hour the whole secret of effective speaking was opened to me.

"For example, I learned why I had always lacked confidence, why talking had always seemed something to be dreaded whereas it is really the simplest thing in the world to 'get up and talk.' I learned how to secure complete attention to what I was saying and how to make everything I said interesting, forceful and convincing. I learned the art of listening, the value of silence, and the power of brevity. Instead of being funny at the wrong time, I learned how and when to use humor with telling effect.

"But perhaps the most wonderful thing about the lessons were the actual examples of what things to say and when to say them to meet every condition. I found that there was a knack in making oral reports to my superiors. I found that there was a right way and a wrong way to present complaints, to give estimates, and to issue orders.

"I picked up some wonderful pointers about how to give my opinions, about how to answer complaints, about how to ask the bank for a loan, about how to ask for extensions. Another thing that struck me forcibly was that, instead of antagonizing people when I didn't agree with them, I learned how to bring them around to my way of thinking in the most pleasant sort of way. Then, of course, along with those lessons there were chapters on speaking before large audiences, how to find material for talking and speaking, how to talk to friends, how to talk to servants, and how to talk to children.

"Why, I got the secret the very first evening and it was only a short time before I was able to apply all of the principles and found that my words were beginning to have an almost magical effect upon everybody to whom I spoke. It seemed that I got things done instantly, where formerly, as you know, what I said went 'in one ear and out the other.' I began to acquire an executive ability that surprised me. I smoothed out difficulties like a true diplomat. In my talks with the chief I spoke clearly, simply, convincingly. Then came my first promotion since I entered the accounting department. I was given the job of answering complaints, and I made good. From that I was given the job of making collections. When Mr. Buckley joined the Officers' Training Camp, I was made Treasurer. Between you and me, George, my salary is now $7500 a year and I expect it will be more from the first of the year.

"And I want to tell you sincerely, that I attribute my success solely to the fact that I learned how to talk to people."

******

When Jordan finished, I asked him for the address of the publishers of Dr. Law's Course and he gave it to me. I sent for it and found it to be exactly as he had stated. After studying the eight simple lessons I began to sell to people who had previously refused to listen to me at all. After four months of record breaking sales during the dullest season of the year, I received a wire from the chief asking me to return to the home office. We had quite a long talk in which I explained how I was able to break sales records—and I was appointed Sales Manager at almost twice my former salary. I know that there was nothing in me that had changed except that I had acquired the ability to talk where formerly I simply used "words without reason." I can never thank Jordan enough for telling me about Dr. Law's Course in Business Talking and Public Speaking. Jordan and I are both spending all our spare time making public speeches on war subjects and Jordan is being talked about now as Mayor of our little Town.

So confident is the Independent Corporation, publishers of "Mastery of Speech," Dr. Law's Course in Business Talking and Public Speaking, that once you have an opportunity to see in your own home how you can, in one hour, learn the secret of speaking and how you can apply the principles of effective speech under all conditions, that they are willing to send you the Course on free examination.

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(*Continued from page* 1041)

while the contract should not have been made verbally, it was so made probably because the people who made it did not know what the regulations were, that the service had been obliged to call in many people without military experience to assist in this work; and that the contract which had been made with the Packard Company was a perfectly regular contract but now drawn up in the regular way.

Major Howard Elliott, Disbursing Officer of the Aviation Section of the Signal Corps, testified that while Section 653 of the Army Regulations provides that:

> "Every order issued by any military authority which may cause an expenditure of money in a Staff Department will be given in writing."

The memorandum consisting of the resolution passed by the Aircraft Production Board setting aside $250,000.00 for this work, was construed as an order because of an erroneous practice that had sprung up.

Major Coleman (from whose written memorandum a quotation has been made) testified at the Hughes inquiry that the resolution referred to was considered authority for the payment of the money mentioned in it; that there were other cases in which money had been set aside in that manner; and that while the regular practice requires that the Bureau should place written orders, that was not considered necessary.

Lieutenant Colonel A. C. Downey, of the Signal Corps, testified that while it was a bad practice to pay out money in cases where there had been no written orders, it was the practice in vogue at that time in jobs "where they wanted to rush things through," simply to request that a given amount of money be set aside, and when set aside, no written orders were placed; and when the vouchers were paid, these vouchers, under the practice, took the place of written orders, that this had been done in hundreds of cases, but that he did not remember any case in which it had been done where a large amount of money was involved.

Under these conditions it is not the opinion of this office that an officer entering the Army from civil life, as did Colonel Deeds, following a practice which he found in vogue in the office, should be court-martialed for an act of the character here involved, which, as found by Judge Hughes in his report, did not defraud the Government, and was not intended so to do.

This office therefore recommends that court-martial proceedings should not be instituted against Colonel Deeds on account of this transaction because: (1) the approval of the voucher in question did not involve any attempt to defraud the Government; (2) as found by Judge Hughes, it did not defraud the Government; (3) the verbal agreement upon which the voucher was paid, as found by Judge Hughes, was fair from the standpoint of the Government.

Conclusion

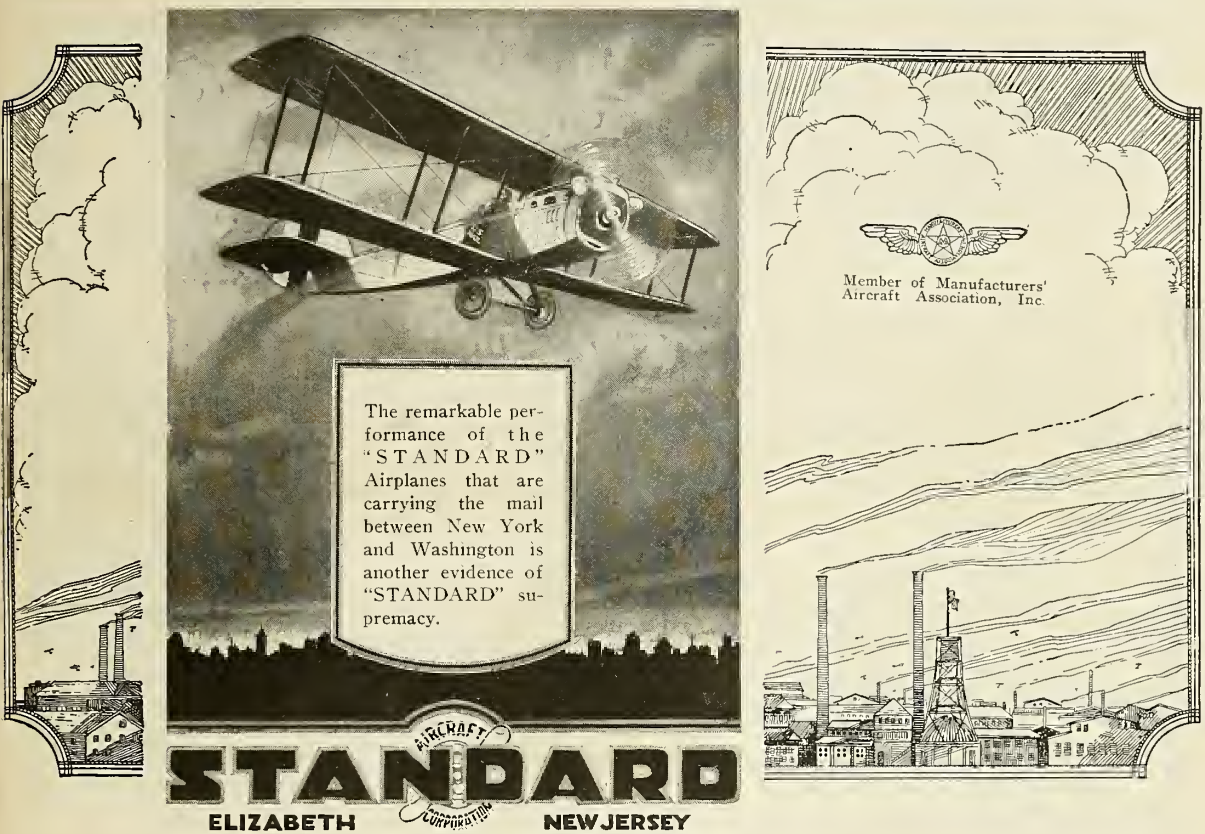
6. The conclusion of this office is, therefore that Colonel Edward A. Deeds should not be tried by court-martial on account of any of the transactions discussed in this memorandum.

The justice of the conclusion thus reached by this office finds confirmation in the following language taken from a letter from Hon. John D. Ryan, Director of the Air Service, addressed to the Secretary of War under date of November 13, 1918:

"I feel, as I stated in a former letter to you, that Colonel Deeds performed a great service in expediting the work on the Liberty motor. If he had followed strict regulations and kept within them in the expenditure of money for the production of the first of these model engines we would probably not have had any quantity production yet. I feel that the patriotic service rendered to the Government and the sacrifice made in connection therewith by Colonel Deeds outweighed any technical violations that might have occurred, and considering the conditions under which this work had to be done, if the aircraft was to take any part in the war within a reasonable time, I think commendation instead of court-martial should be Colonel Deeds' reward."

7. There are attached here to the following papers: (a) the memorandum from the Secretary of War referring the matter to this office for report and recommendation, together with the papers attached thereto, (b) endorsement from this office dated November —, 1918, returning to the Adjutant General a memorandum from the Inspector General's Department, dated November 2, 1918, and the accompanying papers; (c) memorandum submitted by this office under date of November 11, 1918, expressing its conclusion based upon the Hughes report; (d) memorandum for Honorable John D. Ryan, Director of Air Service, signed W. W. Montgomery, Chief Advisory and Consulting Department, dated November 11, 1918; (e) memorandum submitted to this office under oath and signed B. F. McCann, attorney for Colonel Edward A. Deeds; (f) affidavit of H. E. Talcott, former business associate of Colonel Deeds; (g) memorandum submitted to the Secretary of War by John D. Ryan under date of November 13, 1918; (h) letter from Major E. A. Coleman, Disbursing Officer, Bureau of Aircraft Production, to this office under dated of November 25, 1918, with exhibits; (i) copy of the official Bulletin, dated February 21, 1918, containing the newspaper article criticized by Judge Hughes in his report; and (j) affidavit of Edward A. Deeds, dated November 20, 1918, together with chronology and copies of correspondence submitted by Colonel Deeds; (k) letter to the Secretary of War from Hon. John D. Ryan, dated November 6, 1918.

(Signed) S. T. Ansell,
S. T. Ansell,
Acting Judge Advocate General.
B. A. A.



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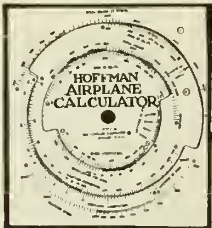

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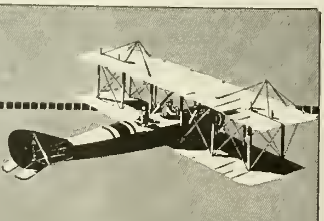

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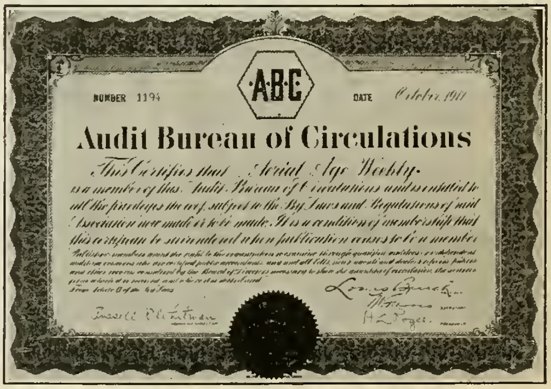

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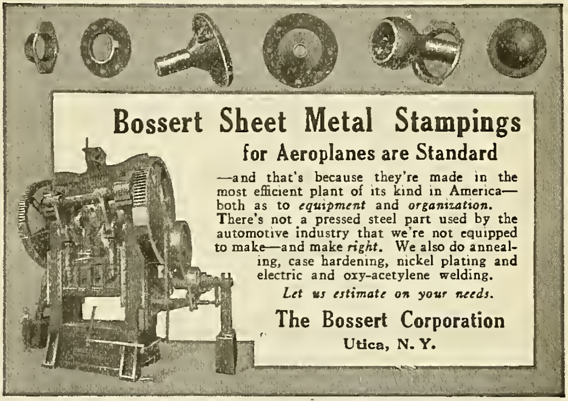

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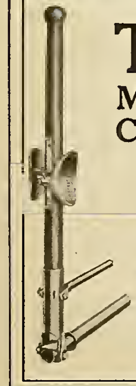

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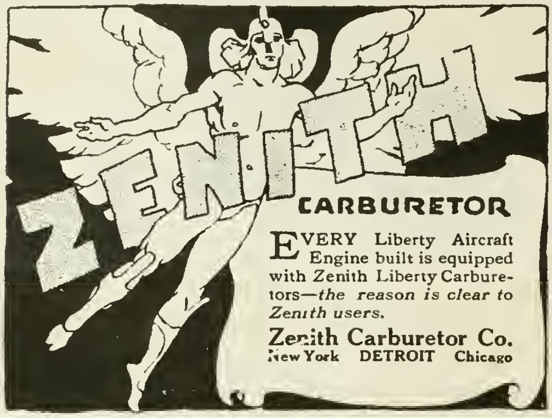

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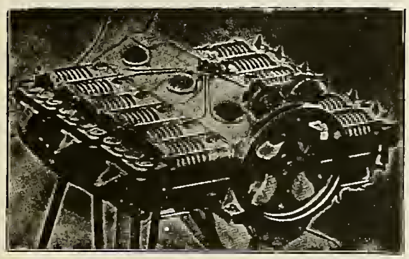

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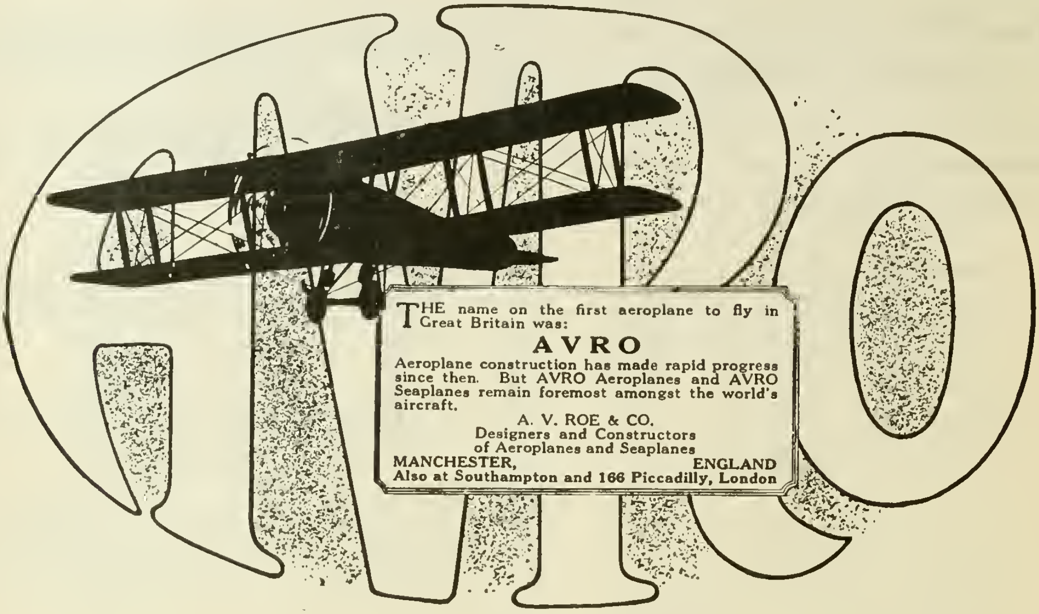

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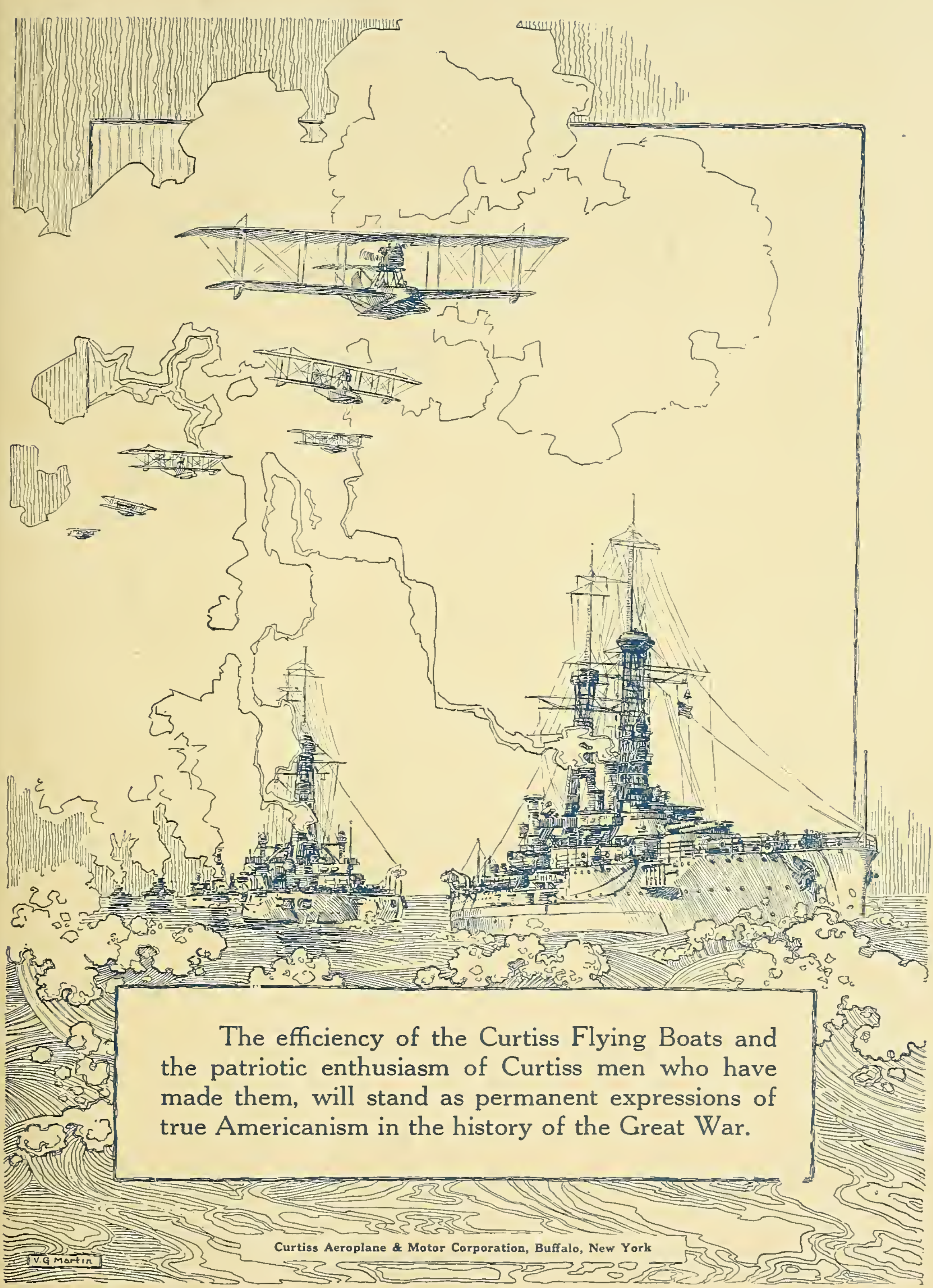

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WEEKLY

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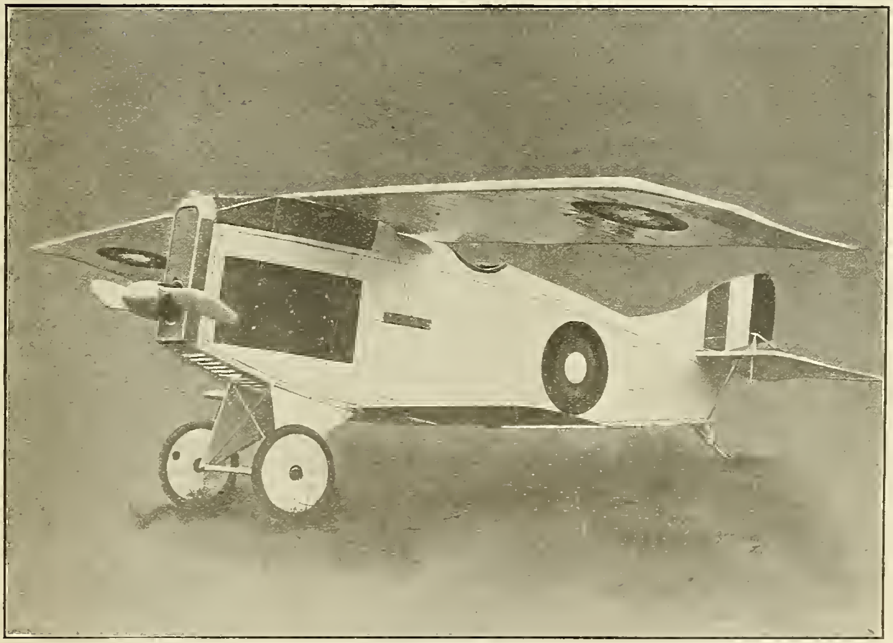

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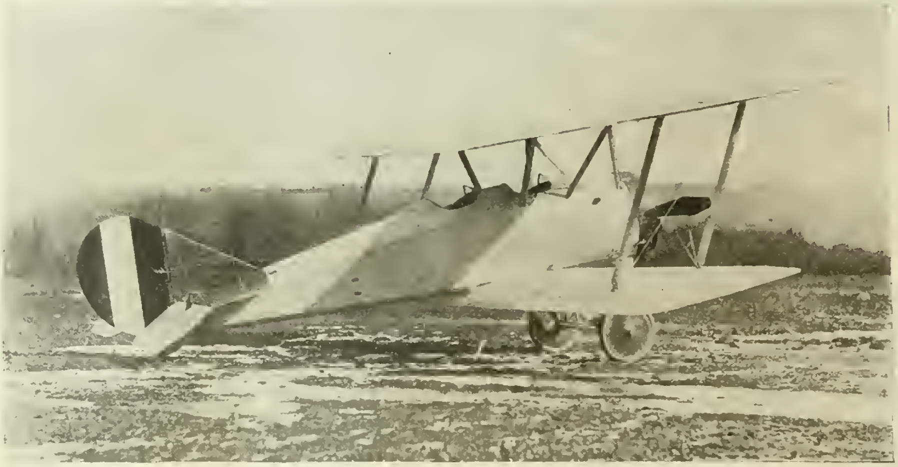

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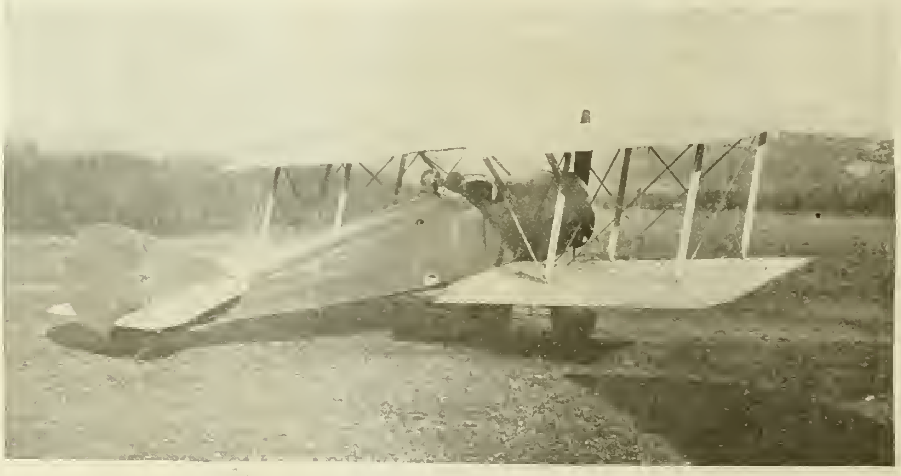

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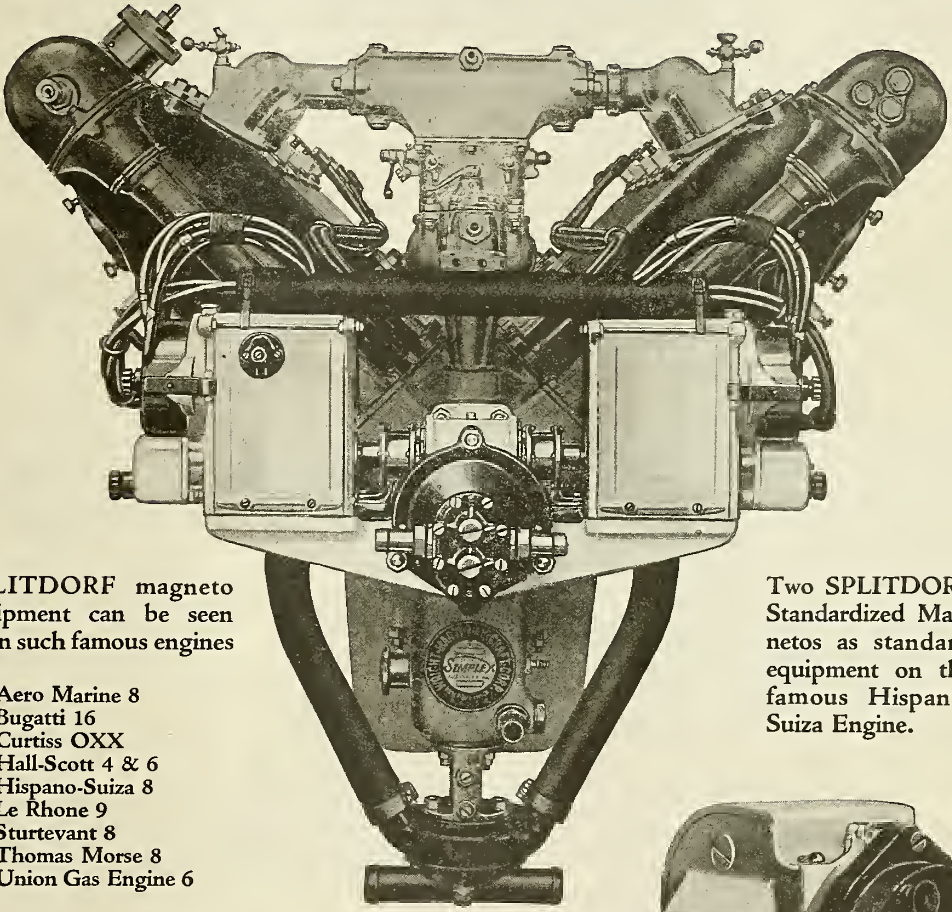

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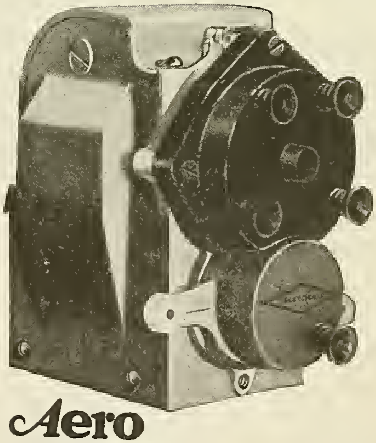

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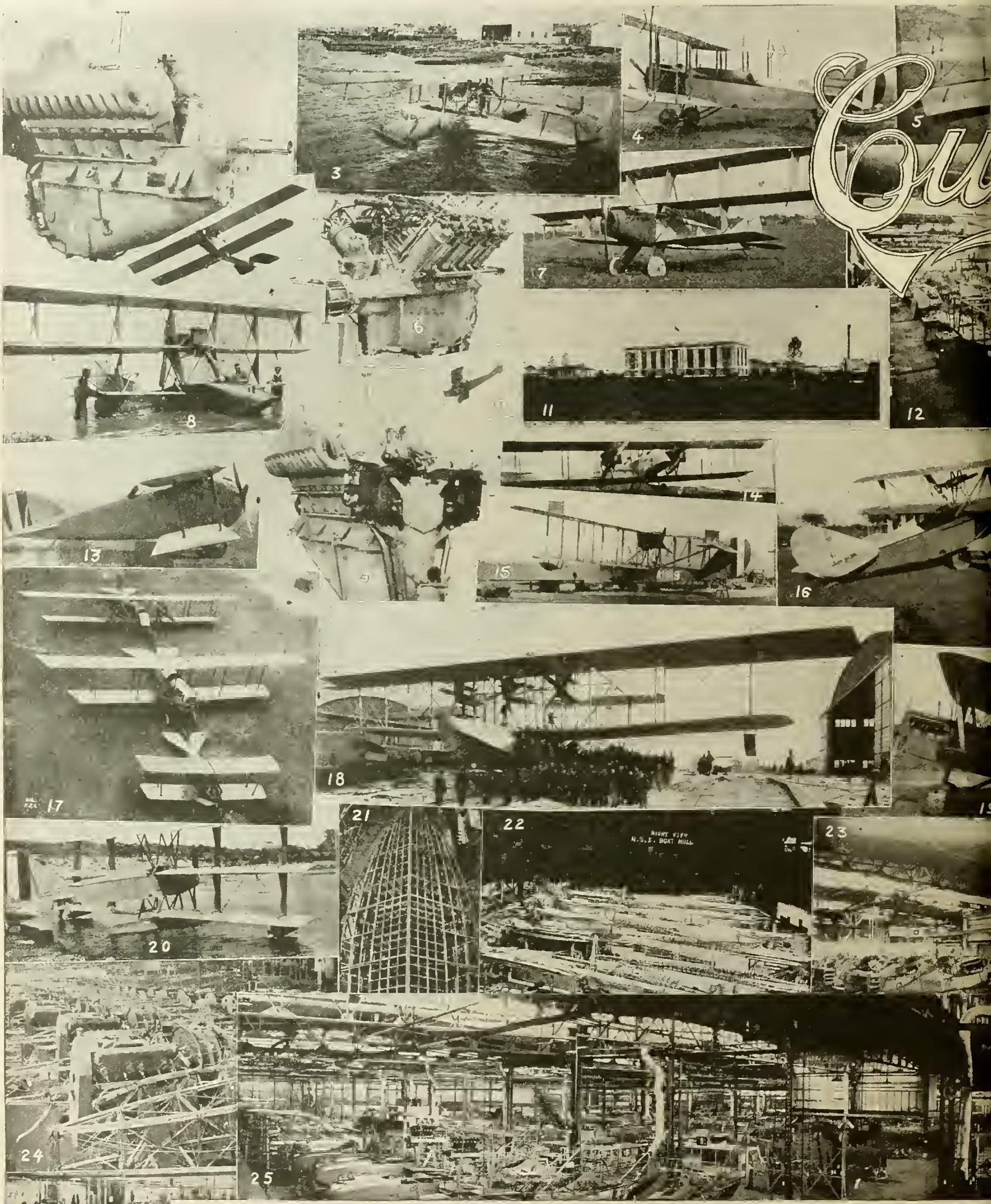

THE INSIDE STO

1. The new Curtiss Model K 12 aeronautical motor.
2. A Curtiss J. N. in flight.
3. The Curtiss Flying Boat built for Rodman Wanamaker.
4. A Curtiss Mailplane.
5. The famous Curtiss J. N. 4D, on which over 98% of all American and Canadian pilots were trained.
6. The Curtiss O. X. motor regarded by experts as the best 90 H. P. aeronautical motor made.
7. The Curtiss Model L Triplane.
8. A Curtiss Triplane Flying Boat.
9. Another view of the Curtiss K, 12 motor — this motor is 25% lighter than any other 400 H. P. motor so far produced.
10. The familiar J. N. profile.
11. The Curtiss Engineering Corporation Plant at Garden City, L. I.
12. The fuselage assembly floor.
13. A recent commercial Curtiss Tractor.
14. A Curtiss twin J. N.
15. A rear view of the Curtiss H. S. 2 flying boat.
16. A Curtiss Triplane military tractor.
17. Three early Curtiss military tractors.
18. The gigantic navy N. C. 1 flying boat, b Curtiss Engineering Corp., recently f 51 persons aboard. The largest flying b world.
19. A modern English type of military tract
20. A Curtiss Triplane Hydro.
21-22. Building flying boat hulls for the na
23. A view on the assembly floor at one of th plants.
24. Another one of the Buffalo assembly floo

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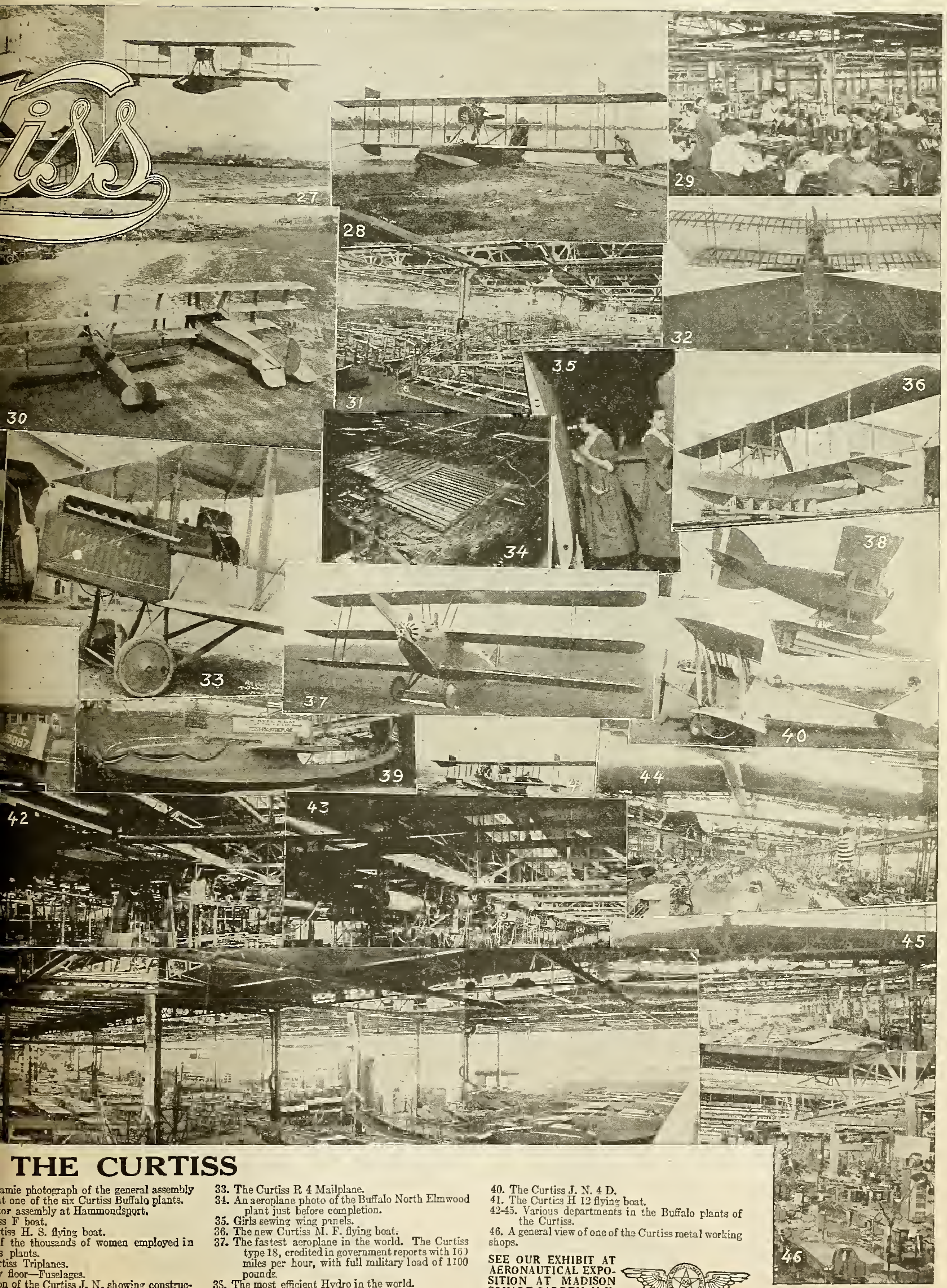

THE CURTISS

amie photograph of the general assembly
t one of the six Curtiss Buffalo plants.
tor assembly at Hammondsport.
ss F boat.
tiss H. S. flying boat.
f the thousands of women employed in
s plants.
tiss Triplanes.
y floor—Fuselages.
on of the Curtiss J. N. showing construc-

33. The Curtiss R 4 Mailplane.
34. An aeroplane photo of the Buffalo North Elmwood plant just before completion.
35. Girls sewing wing panels.
36. The new Curtiss M. F. flying boat.
37. The fastest aeroplane in the world. The Curtiss type 18, credited in government reports with 160 miles per hour, with full military load of 1100 pounds.
38. The most efficient Hydro in the world.
39. The first hull of the FSL flying boat.

40. The Curtiss J. N. 4 D.
41. The Curtiss H 12 flying boat.
42-45. Various departments in the Buffalo plants of the Curtiss.
46. A general view of one of the Curtiss metal working shops.

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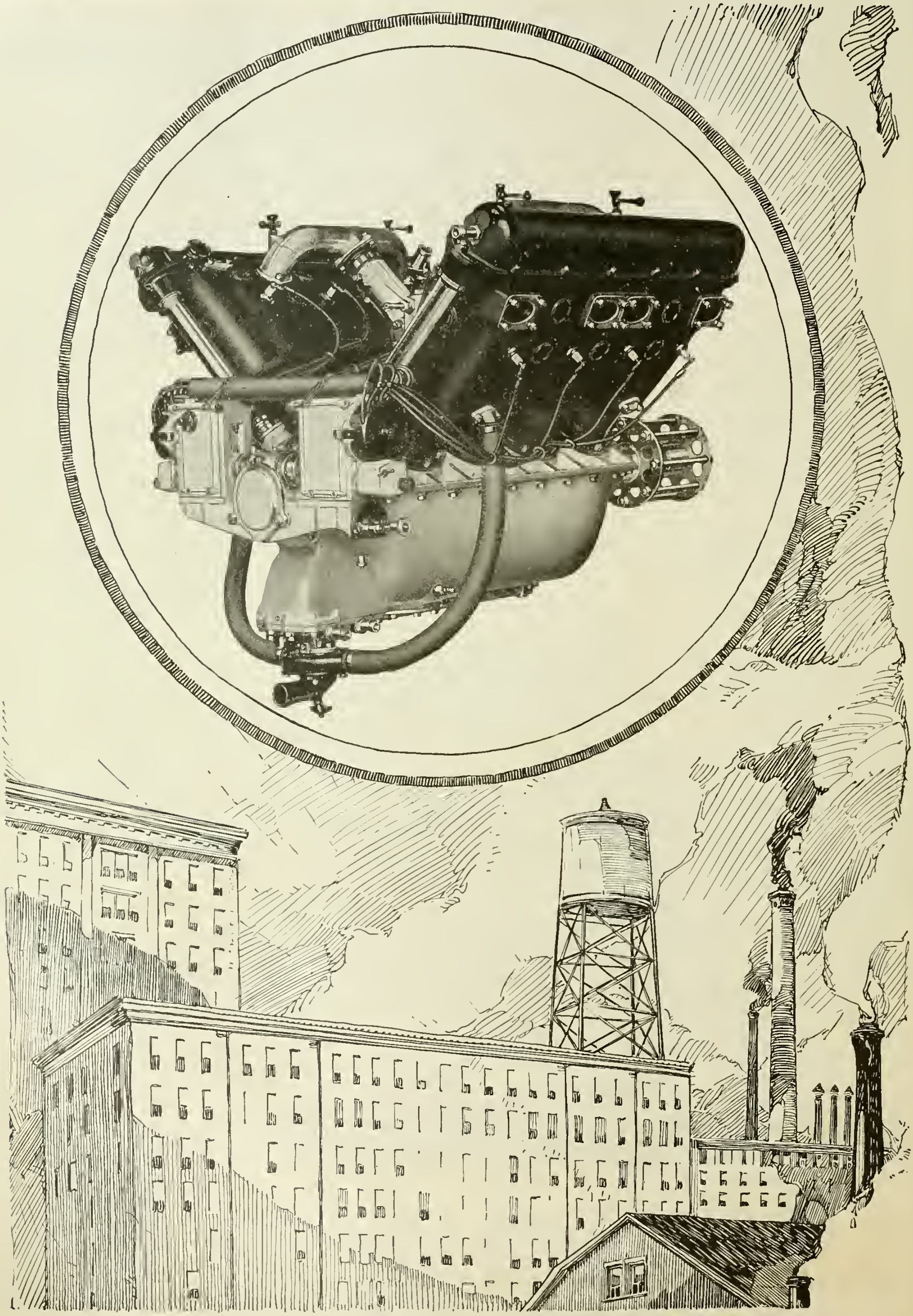

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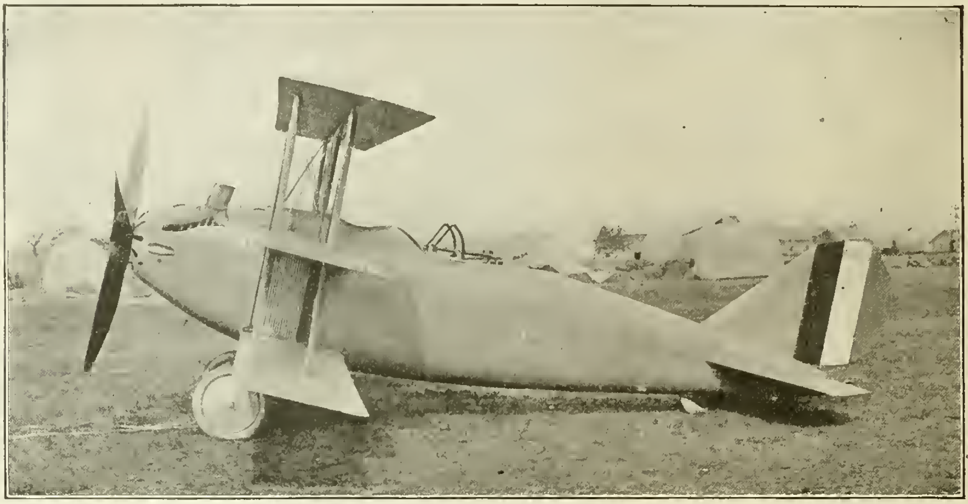

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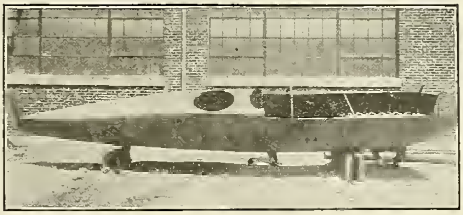
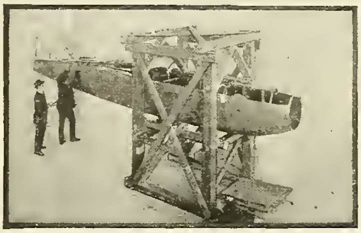
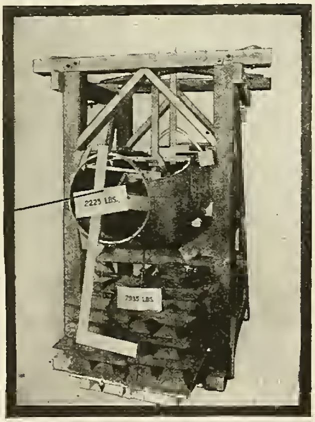


The finished eggshell. A Haskelite fuselage, U.S.C. No. 1, ready for assembling in an airplane. The use of Haskelite saves many pounds of excess weight which is absolutely necessary to the construction of the ordinary fuselage.



Ready for the test. The fuselage resting in a cradle. Note weight platform at lower right.



The break comes. Two strains were applied: a forward pull, and a downward twisting load, to simulate engine-torque. The nose failed under the respective minimum loads of 2225 and 7935 lbs., a combined strain of more than five tons.

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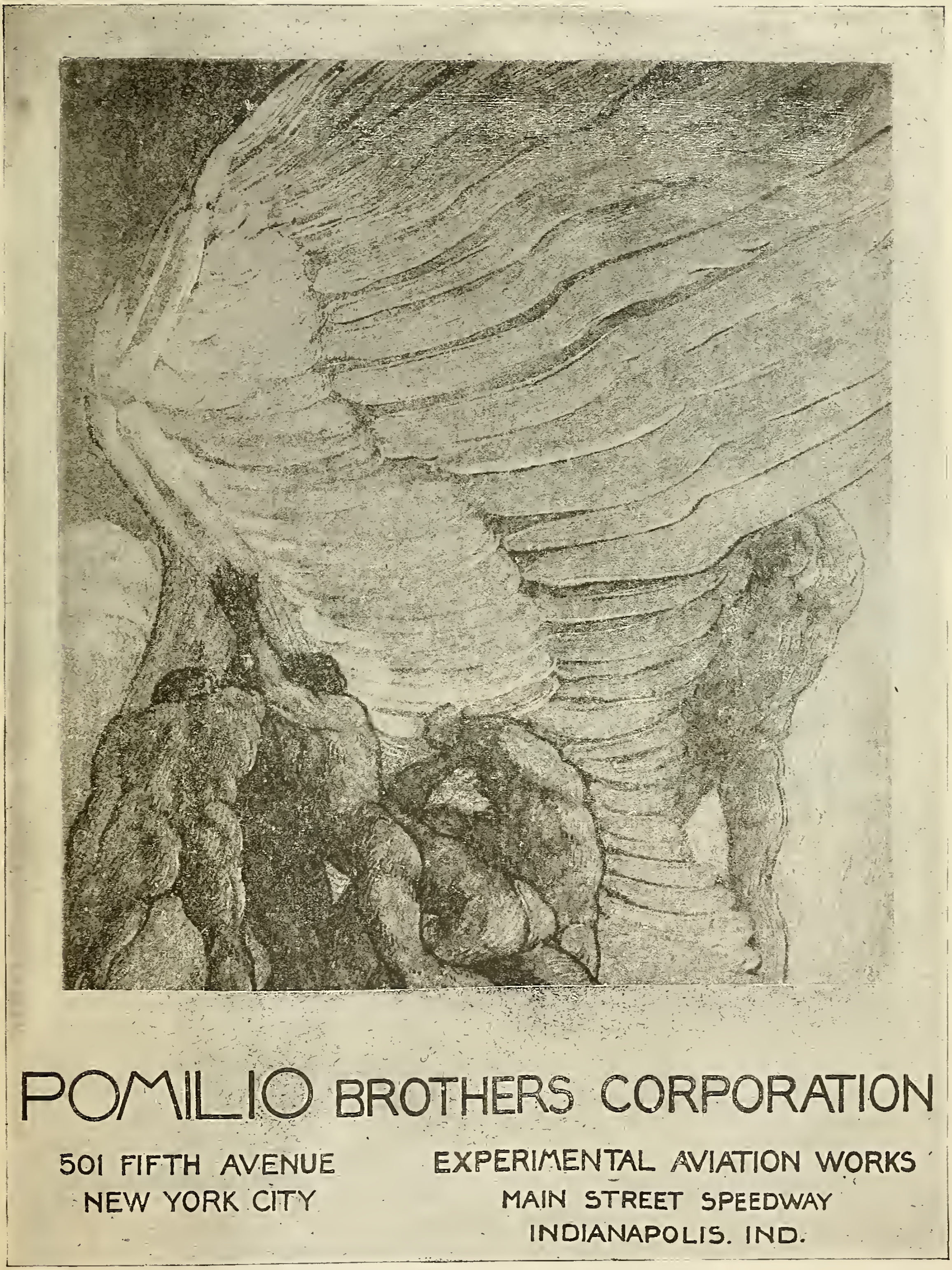

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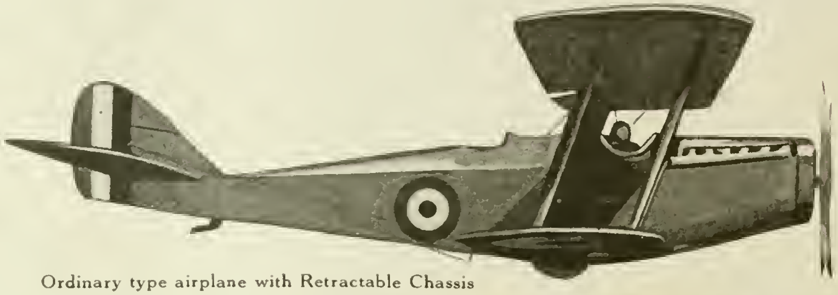
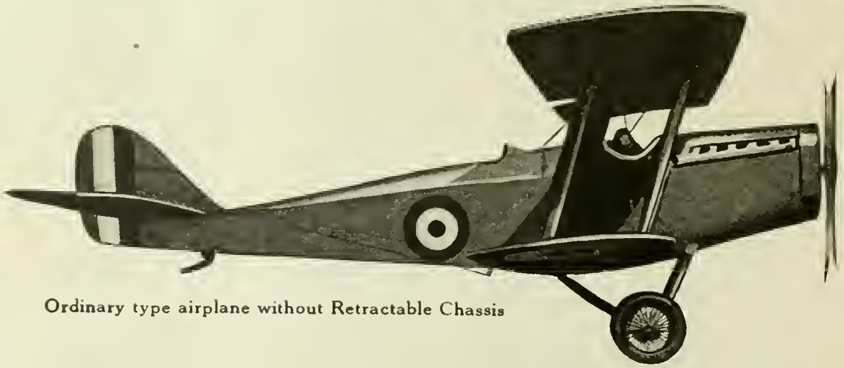
Or These Planes in a Speed Test?



Ordinary type airplane with Retractable Chassis



Ordinary type airplane without Retractable Chassis

The following is an extract from a report by Mr. L. V. Kerber on one of the latest U. S. Army airplane designs:

Effects of retracting the Chassis

Total Resistance of Extended Chassis .... 59.6 #

Total Resistance of Retracted Chassis 11.0

Difference 48.6

At 100 miles per hour the structural resistance with chassis extended is 230 # plus 48.6..................278.6

By retracting the chassis the structural resistance is decreased $\frac{48.6\,\#}{278.6}$ 17.4%

At 100 miles per hour the total resistance with chassis extended is 210 plus 278.6...........................488.6 #

By retracting the chassis the total resistance is decreased $\frac{48.6\,\#}{488.6}$ 10%

By retracting the chassis the maximum horizontal velocity is increased $\frac{145}{137} - 1$.................. 6%

In order to meet both aerodynamical and practical demands the following patented features will be recognized as indispensable to any type of retractable chassis:

1—The chassis should be equally strong in spite of its retractable feature.

2—It should not weigh more including retracting mechanism than the ordinary chassis.

3—It should neither occupy useful space when retracted nor require an enlarged fuselage to house it.

4—It should be adapted in strength as an alighting device in any intermediate position between fully extended and fully retracted, both in case the pilot should make a hurried descent and in order to make available a ready means of varying the position of the chassis relative to the centre of gravity of the aeroplane.

5—It should automatically close the housing recesses so that the fuselage or wing skin forms a flush surface when chassis is retracted.

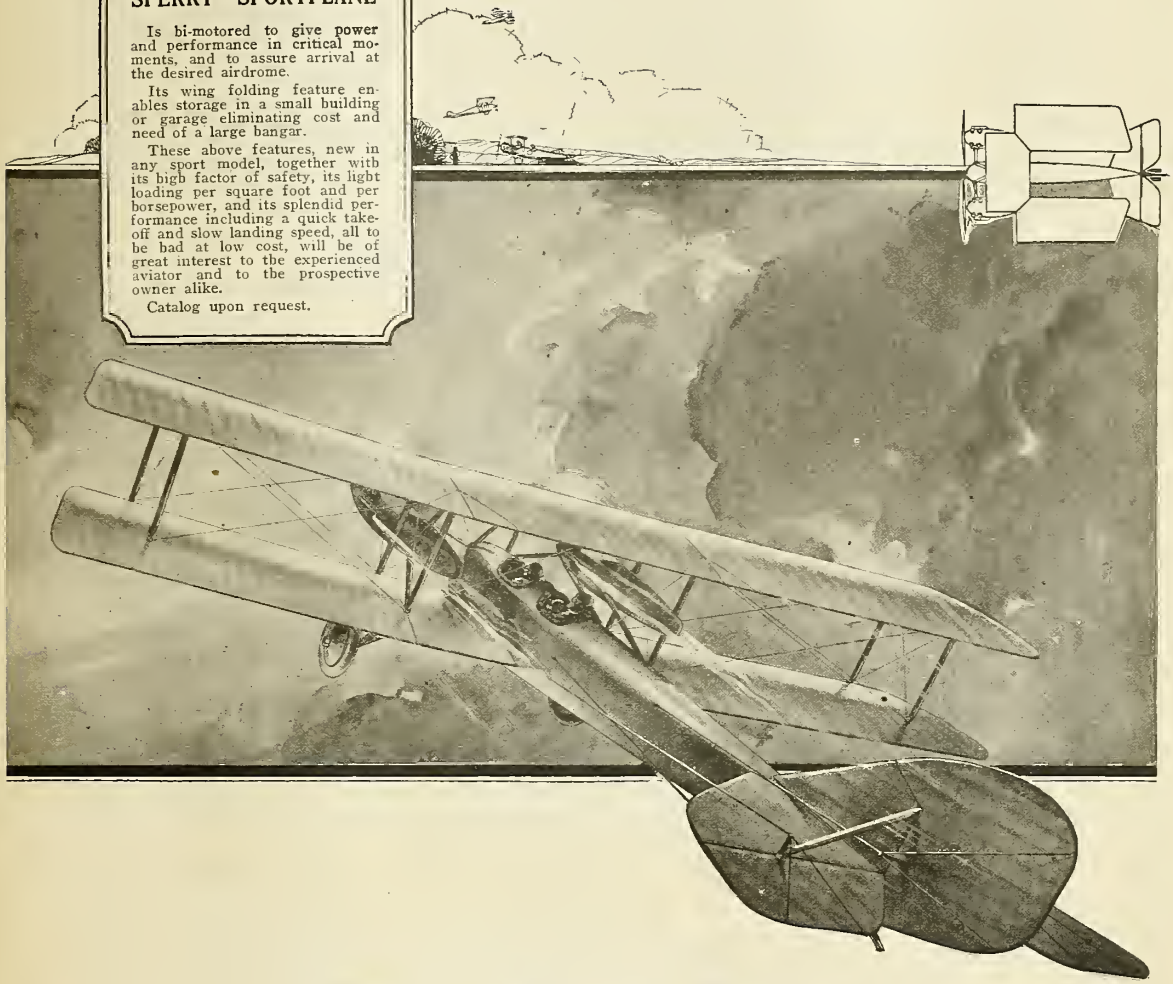
6—The gage and tread of the chassis should be independent of the width of the fuselage.

7—It should utilize the forces of flight, since they are always available, for power to retract and extend and such action should be entirely automatic when released by the pilot.

For Engineering data and License apply to

Capt. Jas. V. Martin, Martin Aeroplane Factory, Elyria, Ohio.
Business address: 918 Reibold Bldg., Dayton, Ohio

EVERY FIRST CLASS AEROPLANE REQUIRES A RETRACTABLE CHASSIS



THE
SPERRY SPORTPLANE

Is bi-motored to give power and performance in critical moments, and to assure arrival at the desired airdrome.

Its wing folding feature enables storage in a small building or garage eliminating cost and need of a large hangar.

These above features, new in any sport model, together with its high factor of safety, its light loading per square foot and per horsepower, and its splendid performance including a quick take-off and slow landing speed, all to be had at low cost, will be of great interest to the experienced aviator and to the prospective owner alike.

Catalog upon request.

The W. B. B. Aeromotor

WE are ready to fill single or quantity orders for this remarkable little motor which is the product of investigation and development thruout the war.

It is a four cylinder, V type, air-cooled 129¾ pound motor developing 38 horsepower.

Besides our exhibit at the Aero Show, we will demonstrate, by appointment at a place convenient to the Show, its simplicity of installation and upkeep and its reliability of operation.

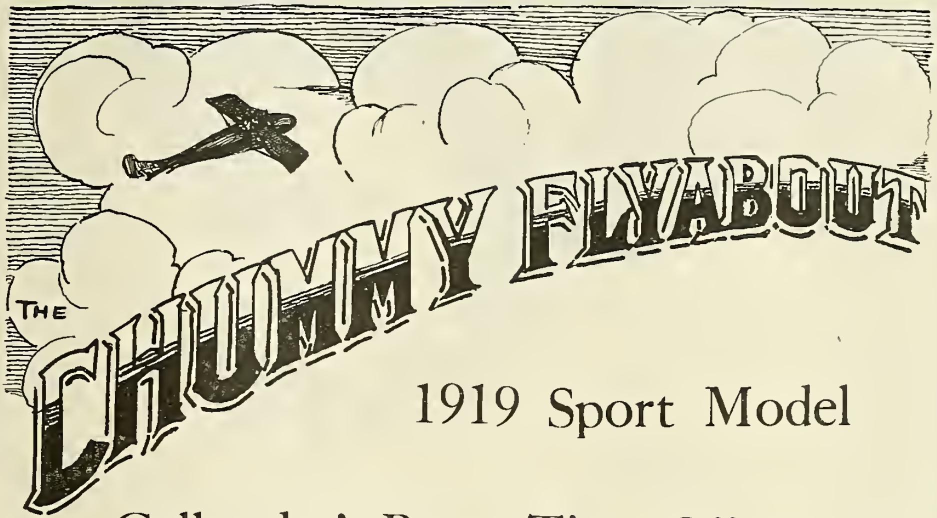
LAWRENCE SPERRY
President
THEODORE ARTER
General Manager

THE LAWRENCE SPERRY AIRCRAFT COMPANY.
FARMINGDALE, LONG ISLAND

As a preliminary step toward the development of commercial aviation in Canada, the United Aircraft Engineering Corporation, acting for a syndicate, has purchased from the Imperial Munitions Board of Great Britain the entire flying equipment of the Royal Air Force in Canada, with the exception of those few planes which the Dominion is retaining as a nucleus for future Military aeronautical development. The equipment purchased was originally valued at close to ten million dollars.

United Aircraft Engineering Corporation
52 Vanderbilt Avenue
New York

AT THE SHOW



1919 Sport Model

Gallaudet's Peace Time Offering to the World of Outdoor Sport

A dependable flying machine designed by experienced aeronautical engineers.

High factor of safety.

Low cost of maintenance.

Sold with or without instructions in flying.

See this little Pleasure Craft at the Aeronautical Exposition, Madison Square Garden, March 1st to 15th, in Space No. 1, or write for literature giving account of recent actual performances.

GALLAUDET AIRCRAFT CORPORATION

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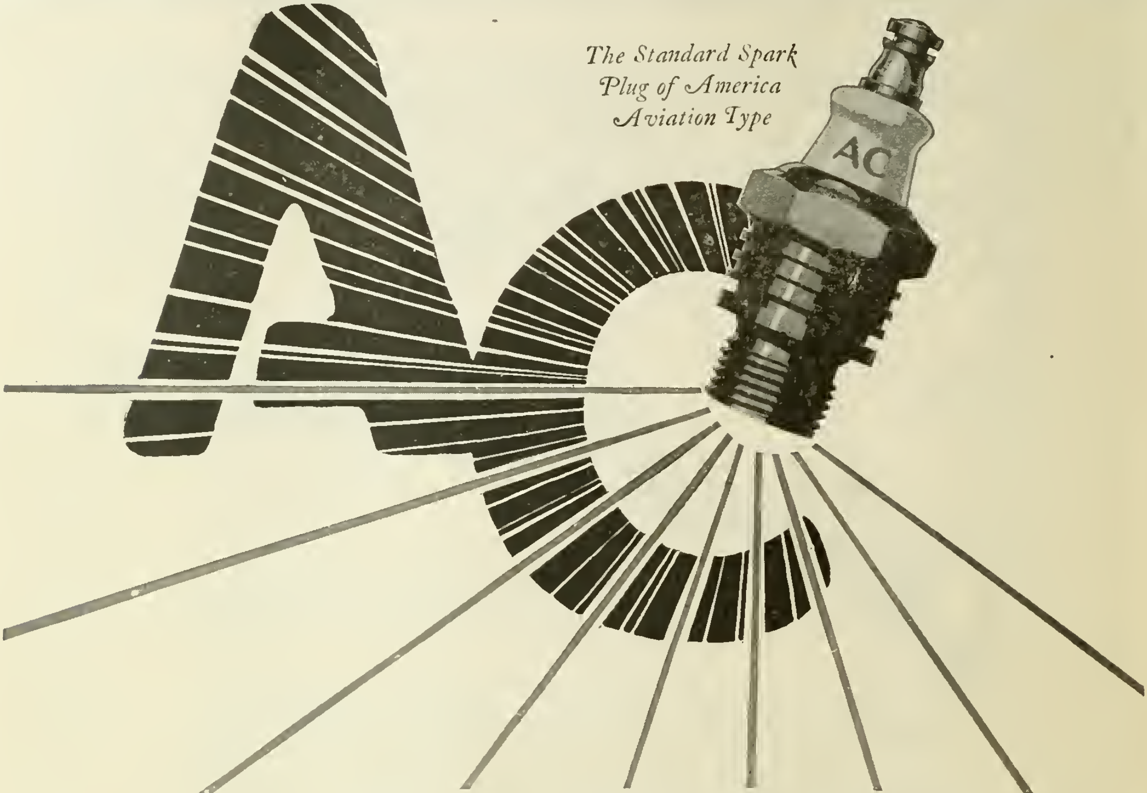
15 East 40th St.
New York City

Factory
East Greenwich,
Rhode Island

(Contractors to U. S. Government)



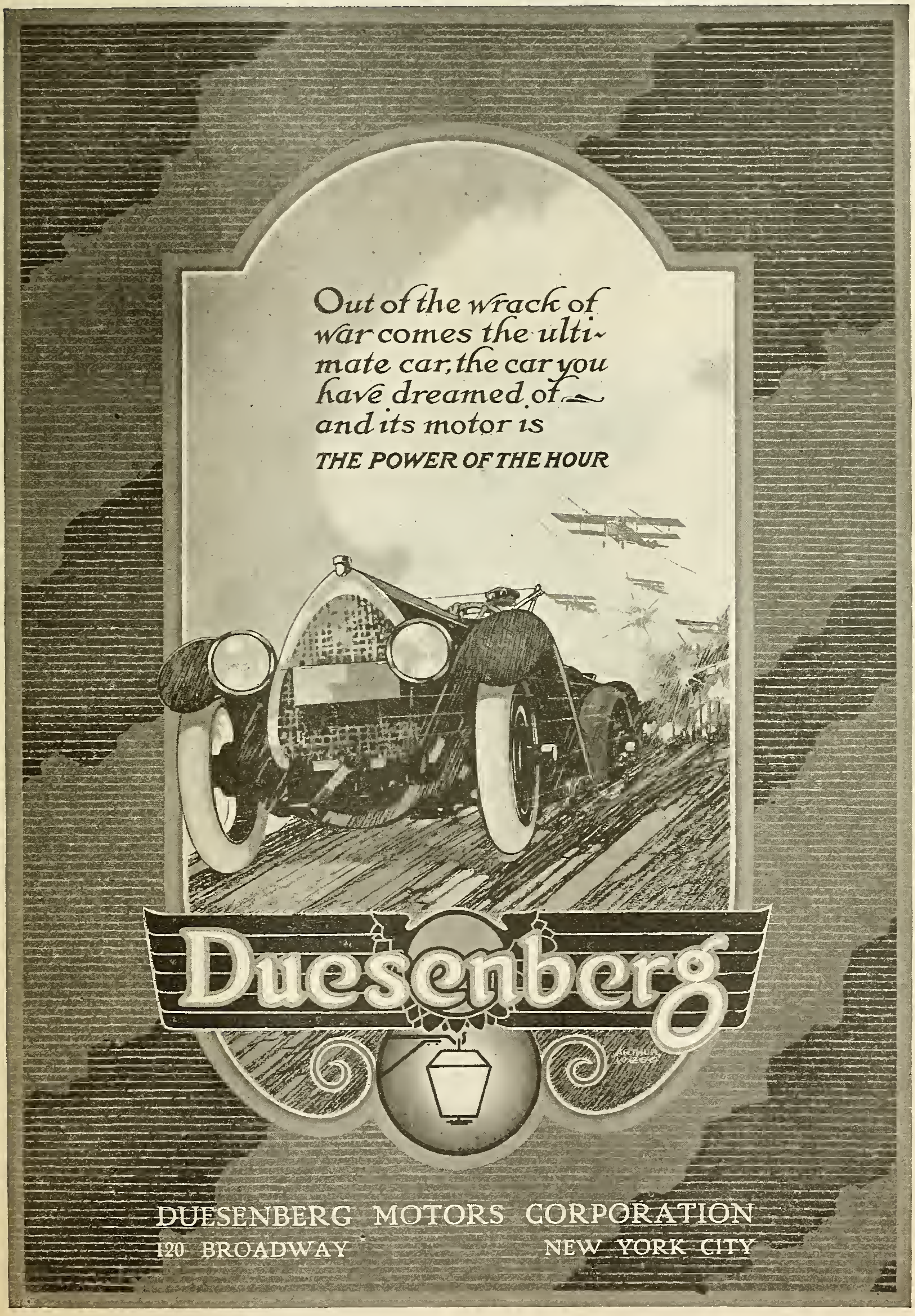
*The Standard Spark
Plug of America
Aviation Type*

The war demonstrated that AC Spark Plugs were the best spark plugs for any type of service. Most makes of motor cars have for years been AC-equipped. During the war all Class B Government standardized trucks carried AC Plugs in their motors. Thousands of these plugs were furnished for ordnance trucks and tanks. AC Aircraft Plugs were standard on Liberty and Hispano-Suiza airplane motors.

Now that our obligation to the Government is fulfilled we are ready to supply AC Aircraft Plugs to private manufacturers.

Champion Ignition Company, FLINT, *Michigan*

U. S. Pat. No. 1,135,727, April 13, 1915. U. S. Pat. No. 1,216,133, Feb. 13, 1917. Other Patents Pending.


Out of the wrack of war comes the ultimate car, the car you have dreamed of—and its motor is
THE POWER OF THE HOUR
Duesenberg

DUESENBERG MOTORS CORPORATION
120 BROADWAY NEW YORK CITY

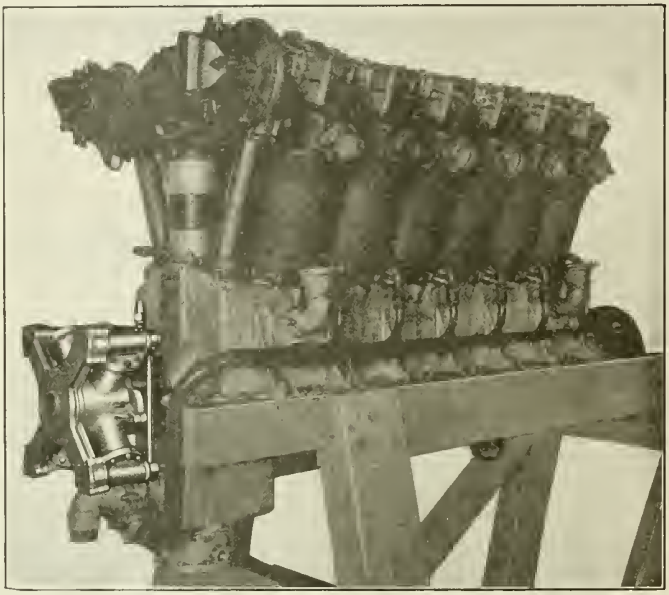
SEE IT AT THE AERO SHOW

(Madison Square Garden)

Liberty Starter

Approved and Now Being Made For U. S. Naval Hydroplanes

Weight, 49 pounds complete.
Cranks motors up to 500 horsepower.
The device itself weighs but 30 pounds.
It is entirely self-contained without brackets or other gearing, bolting direct to crankcase of engine, and cranking direct to end of crankshaft.



A small air cylinder, 1¼" x ¾" with piston running continuously for air pressure on gasoline feed tank is combined with the device and entirely independent in action. This starter furnished with or without it at option.

Official Tests All Satisfactory

CURTISS AIRPLANE CORPORATION
April 20-22, 1916

HALL-SCOTT MOTOR COMPANY
Dec. 6-7, 1916

WASHINGTON NAVY YARD
Aeroengine Testing Lab.
Oct. 23-24, 1917

LANGLEY FIELD
May 15, 1918

Information regarding these trials given on request.

THE simplicity and reliability of the Liberty Starter for Airplanes are due to the fact that compressed air, the most reliable and easily controlled motive force known, is the actuating energy.

Where chances of starter trouble cannot be taken, as, for instance, on naval seaplanes, this type of starter is equipped. Liberty Starters have been thoroughly tested by the U. S. Navy, and are used on U. S. Naval Planes. (See list of tests made.)

The Liberty Starter is an air motor for starting, and a compressor to store air for its own energy in starting. It is entirely self-contained; couple direct to end of crankshaft of motor; needs no alteration in motor or gear reduction, and has ample power for magneto starting. It is the *one* efficient, *dependable* type of starter for airplanes to-day.

We welcome comparative tests, and will gladly arrange for any kind of trial for the Liberty Starter.

Specifications on Request

MOTOR COMPRESSOR COMPANY
52-60 Dickerson Street
Newark, N. J.

An Achievement

WHEN, thru coming years, the big things of The Great War shall stand out in retrospective review, the truth will be realized that, in the forefront of achievements of dominating and lasting value and influence, the necessity of the hour gave to the world the development of the Airplane on a quantity production basis.

And thus a new industry was born. Some years before, two brothers in Dayton had invented, developed and produced a few successful heavier-than-air machines. It is with a feeling of just pride that—from a manufacturing standpoint—we can now look back over recent events and realize our achievement, along with that of so many others; and—

FOUR FACTS LOOM UP PREDOMINANTLY

1. The FIRST American-built battle plane was turned out by the Dayton-Wright Airplane Co.
2. The first planes this country sent to France were made in—and shipped from—our factory in Dayton.
3. We made and shipped over 80% of all the American-built battle planes that ever reached the Front.
4. The Dayton-Wright Airplane Co. produced more planes per day than any other plant in the world.

There were no precedents to guide the way. The thing had never been done before. But the issue was met—a new industry was born—the Airplane was made a manufacturing possibility on a quantity production basis. An interesting story of this work—in an attractive booklet entitled "An Achievement"—furnished free on request to those who may be interested.

The Dayton-Wright Airplane Company
DAYTON, OHIO
(The Birthplace of the Airplane)

The Goodyear Tire & Rubber Company for the past eight years has been the leading manufacturer of balloons and rubberized balloon fabric in America.

During this period we have manufactured over eight hundred full size balloons. Consequently our balloon production experience has covered a wide field.

Our workmen are balloon craftsmen — our aeronautic engineers and designers are leaders in their respective fields.

It can be truly said that The Goodyear Tire & Rubber Company to a very marked degree has directed lighter-than-aircraft development in this country for the past eight years.

We have always believed and do believe in the future of Aviation.

We are confident that the day is not far distant when passenger travel by air will be an established reality—established on a commercial basis as a necessary form of modern transportation.

We are ready for this great development.

We already manufacture balloons of every proved type—spherical, kite and dirigibles.

On special sizes and types we are prepared to submit plans and specifications to cover any size and type of balloon desired—from miniature models, gas containers, and advertising balloons to huge Aerial Trans-Atlantic liners.

The Goodyear Tire & Rubber Company
Akron, Ohio

GOODYEAR
AKRON

Much depends

on

dope-

Ensure
the best results
by using

TITANINE
DOPE

THE
ORIGINAL
NON-
POISONOUS

Now being manufactured in America under license from Titanine, Ltd., contractor to British, French and Italian Governments.

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Factory: Union, Union County, New Jersey

Manufacturers of
Aeroplane Dope Finishing Varnish
Pigmented Varnish Identification Colors
Planoline Fireproofing Solution
Dope Resisting Paint

AERIAL AGE
WEEKLY

VOL. VIII MARCH 3, 1919 No. 25

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Air Service Demobilization

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The Aerial Register

(To appear shortly under the auspices of AERIAL AGE WEEKLY)

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If **YOU** hold any of the above qualifications, but have not yet registered, you are invited to communicate with the Editor (Air Service Demobilization Department) AT ONCE.

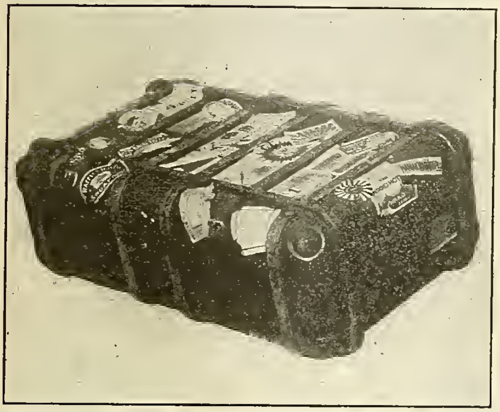
280 MADISON AVE., NEW YORK

Pioneer History of Water-Proof Ply-Woods

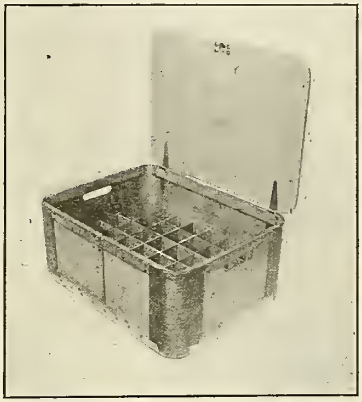
Its development in America by the Dodge Manufacturing Company, as applied to

INDESTRUCTO

Products



Indestructo Globe Trotter Trunk built in 1904 of water-proof ply-wood

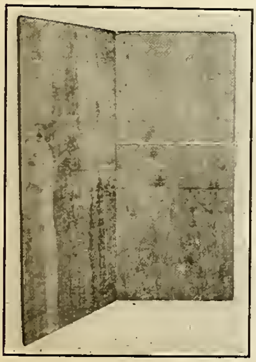


Indestructo bottler's case patented in 1904—built of water-proof ply-wood

THE process of wood lamination or wood veneering dates back to the time of Pliny in the days of the Roman Empire, at which time it was quite generally used on fine furniture.

While the present process is a common one to wood workers, the scope of the practice was until 1904 limited, on account of the failure of known glues and cementing processes to hold under all conditions of atmosphere and contact with moisture.

In 1904, coincident with the growing necessity for the conservation of timber, came the discovery of the Indestructo ply-wood process, and its introduction to the American markets by the Dodge Manufacturing Company, as the first water-proof ply-wood that had been offered for commercial use in this country.



Large water-proof seven ply panels built for table tops in 1908

No branch of forest utilization, with the possible exception of pulp wood has shown such rapid development in the last ten years as the veneer industry as a whole.

In 1905, 132,800,000 feet of logs were used by veneer makers, but as the amount of timber cut from the log averages about 20% greater than the logs measure, it is safe to say that the timber used for veneer stock would have made more than 166,000,000 feet of ordinary lumber.

Until the discovery of the Indestructo process, only a few of the hard woods were available for use in laminated woods.

By the Indestructo process all woods except those containing resinous sap can be utilized in the manufacture of water-proof, weather-proof multi-ply construction.

In 1904 the first commercial product manufactured of water-proof ply-wood was placed on the market; this was the famous Indestructo trunk made by the Dodge Manufacturing Company of Mishawaka, Indiana, and of which there have been 275,000 sold in the last fourteen years.

Heretofore the "Veneering process" had been largely applied to fine furniture, pianos, interior finishing, etc. Quite naturally the Dodge Manufacturing Company, after its acquisition of the veneer process, searched the available commercial fields for the exploitation of ply-wood as a substitute for solid woods for utility purposes.

The Indestructo bottler's case was developed in 1907, and sold by the hundred thousands to brewers all over America.

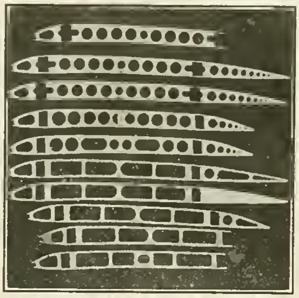
This was one of the most difficult and exacting usages to which ply-wood had ever been subjected.

Contact with moisture, steam and spirits in bottling houses constituted a test that proved beyond a shadow of a doubt the adaptability of Indestructo ply-wood for such purposes.

Cowling and after-deck covering built of Indestructo ply-wood for DeHaviland Fours

In 1908 the Dodge Manufacturing Company installed in the new mill of Hecker-Jones-Jewell Milling Company of New York, 20 flour receiving bins, 50 ft. high and 4 ft. in diameter, and holding a slipping load of 30,000 pounds of flour each. These receptacles superceded the use of the old style stave and steel equipment, because of their freedom from sweating and caking of flour on the inside surface and as a protection against vermin.

These bins are in operation today, and are in as good order as when they were put in eleven years ago. This same installation included the housing equipment for 112 roller mills.



Ply-wood wing members for DeHavilands

In 1906 the first ply-wood barrel was constructed.

A striking feature of its pioneer construction was its lightness and the elimination of leakage, as well as the unit head.

Safety covering for factory machinery, all types of trunks, laundry hampers, meat carriers, delivery boxes, heat deflectors and wall covering followed the process of engineering development up until 1916 when the attention of the Government was first directed to the necessity for water-proof ply-wood to be used in airplane and dirigible construction.

During that time the ply-wood manufactured by the Dodge Manufacturing Company had been made and sold on water-proof guarantee since 1904.

It had been subjected to the most unusual tests, of which the most notable perhaps was the construction in 1916 of a large sign board, 30 feet long by 12 feet high, erected near the plant for advertising purposes.

The face of this board consisted entirely of three-ply veneer, protected only by paint against the elements.

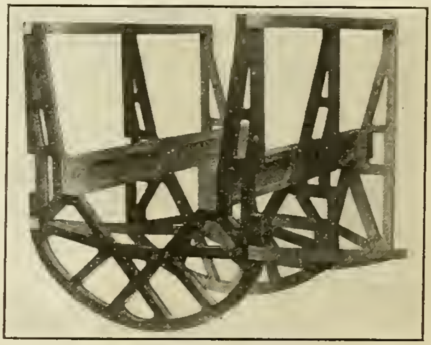
That the board is standing today in its original condition is sufficient evidence in itself of the durability of the product made by the Dodge organization.

There is no doubt in the minds of the commercial world as to whether or not the Dodge Manufacturing Company made the first use of waterproof ply-wood in America.

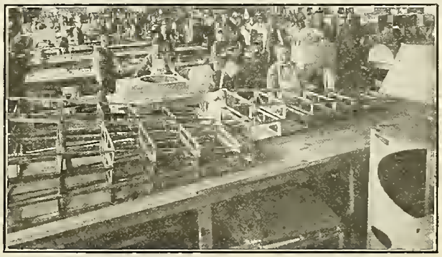
There is no doubt in the minds of the users of Indestructo trunks and other products since 1904, that the material used in the construction of these products was actually of the water resisting type, and embodied maximum strength with minimum weight.

In 1917 the United States Government first experimented with ply-wood for use in aeroplane construction.

The Dodge Manufacturing Company taking the initiative, immediately placed its entire organiza-

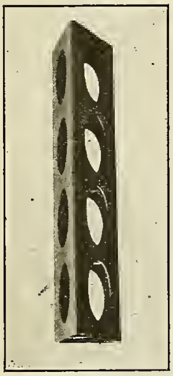


Engine bearers for Liberty motored DeHaviland Fours tion of engineers and practical mechanics at the disposal of the Government in working out a suitable basis upon which ply-wood could be produced in great quantity for such uses.

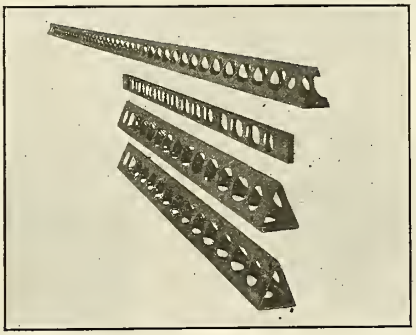


Interiors of airplane construction rooms in Dodge Mfg. Co. Plant No. 2

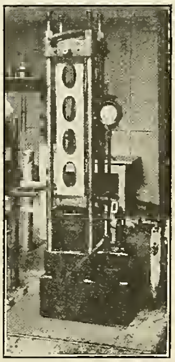
Co-operating with the various national testing, experimental and research laboratories, the Dodge organization placed at their disposal the vast amount of data and practices collected in the course of 14 years' experience with water-proof ply-wood, thus enabling a rapid and thorough adaptation of tests and standards by which the facilities of wood workers in other lines might be adapted to the intensive production that was required.



Transverse girder, 3 ft. long weighing 12 oz. that broke at 22,600 pounds pressure

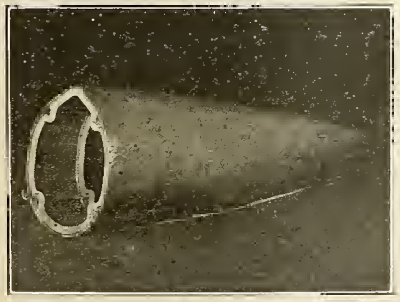


Transverse girder sections built for Bureau of Naval Construction and Repair



Testing Press in Dodge Laboratory

During the period of the war the Dodge Manufacturing Company constructed cowling, after-deck covers, wing beams, ribs and engine bearers, for the De Haviland 4's, working in conjunction with the Dayton-Wright Aeroplane Company of Dayton.

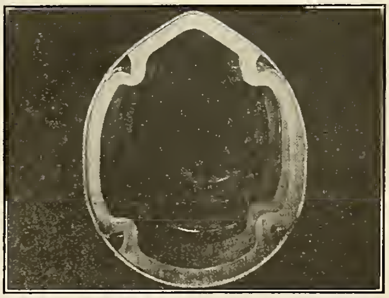


Monocoque fuselage built without cross wires or interior bracing

Press capacity was immediately increased to meet the demands of the Government, and thousands of feet of water-proof ply-wood was furnished to the Naval Aircraft Factory at Philadelphia, to the L-W-F Engineering Company, and its sub-contractors for use on sea-planes; to the Thomas Morse Aircraft Company of Ithaca, N. Y., and to other of the leading builders and sub-contractors of aircraft, working on Government contracts.

In the Fall of 1917, the Bureau of Naval Construction and Repair of Washington submitted drawings from which samples were to be built and tested, covering transverse girders and other frame members for dirigibles.

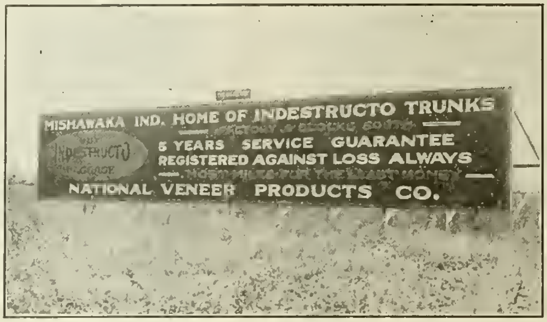
After considerable



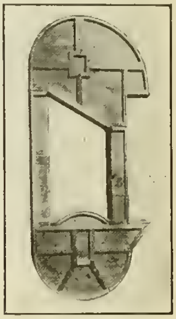
End view of Monocoque fuselage

study and experiment at the Dodge plant, a triangular girder was built, a three-foot section of which, weighing 12 ounces per foot, finally broke under a total pressure of 22,600 pounds, or 6,027 pounds per pound of weight.

Flour mill boot made of ply-wood with butt joints affording smooth interior surface


MISHAWAKA IND. HOME OF INDESTRUCTO TRUNKS
INDESTRUCTO
5 YEARS SERVICE GUARANTEE
REGISTERED AGAINST LOSS ALWAYS
NATIONAL VENEER PRODUCTS CO.

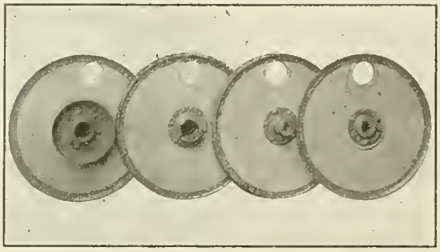
Ply-wood sign board exposed to weather protected only by paint



Ply-wood safety covering for Band Saw

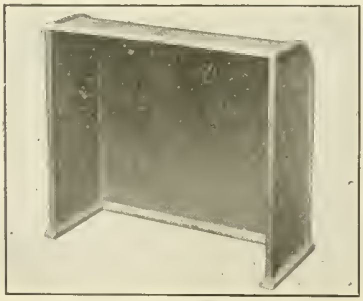
Photographs accompanying this article on the opposite page, show the girder and the hydraulic press used in testing.

The first Monocoque fuselage built in this country was submitted to the Government early in 1917. This fuselage was built without cross wires or bulk heads, the strength of the whole structure being carried by the skin and laminated longerons, as illustrated on the opposite page.



Motor car wheels built of heavy ply-wood

In addition to the manufacture of aeroplane parts, the Dodge Manufacturing Company designed and constructed field container and shipping cases for the Lewis machine gun and balloon trunks of considerable size for the Goodyear Tire & Rubber Company.

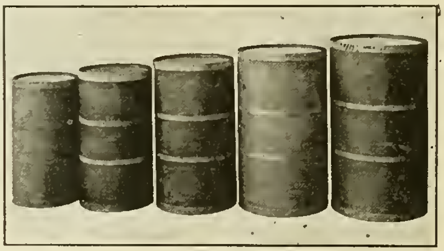


Heat deflectors for hot air registers

The files of the Dodge organization are filled with hundreds of testimonials from users of Indestructo products that prove conclusively the general satisfaction that has been experienced in the last fourteen years from the use of Indestructo ply-wood.

Considerable literature has been issued from time to time by the Dodge organization and is available to those requesting it.

The war is over, and while the demand for aeroplane parts constructed of ply-wood is in suspension pending the rearrangement of the industry to meet the peace-time program, the wheels of the Dodge plant are turning just as busily in the production of their regular ply-wood products as they were before the interruption caused by the war.



Ply-wood barrels of progressive sizes for nesting during return shipment

The demand for Indestructo trunks, hampers and other products is greater today than it has ever been, and one need only step into the highest-class trunk-selling store in any city to learn once and for all how highly Indestructo-made goods are regarded by dealers and users throughout America.

From the position of pioneer to that of leadership, covering a period of fifteen years, each filled with study, experiment, failure and ultimate success, the Dodge Manufacturing Company have found a satisfaction in the development of Indestructo ply-wood products that fully measures up to the accomplishments of Dodge products in other lines.

Dodge equipment for the mechanical transmission of power is known the world over for its quality, standardization and reliability for the service intended.

And we point with pride to our final record of achievement in the ply-wood industry as being the highest recommendation of the Dodge reputation as engineers.

DODGE MANUFACTURING COMPANY
Ply-Woods Products Division
MISHAWAKA - - - INDIANA

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AMERICAN AERONAUTICS' GREAT FUTURE

AMERICAN aeronautics has a great future. It only requires the proper impetus to start the different aeronautic activities.

This impetus is to come through the combined results of the Aeronautical Exposition being held at Madison Square Garden and the 69th Regiment Armory and the Aeronautic Convention and aerial contests to be held under the auspices of the Aero Club of America, the Aerial League of America and the Pan-American Aeronautic Federation in May.

Substantial results are assured from these successive events. The present exposition will show the aircraft produced in the United States during the past year. The aerial contests to be held in May will show in operation the aircraft which are ready for sport, aerial transport of mail, express and passengers, exploration, aerial forest patrol, meteorologic research, and other utilitarian purposes, as well as the military and naval aircraft.

The Aeronautic Convention is to bring up for consideration every important phase of aeronautics and is to be attended by hundreds of authorities from all over the world and, it is expected, by thousands of people. The plans for both the contests and the convention, which are to be announced in a few days, are most extensive and promise to answer the questions which thousands of people have been asking during the past three months regarding the future of American aeronautics.

Whenever we have stated that American aeronautics has a great future and that the "peace" aeronautic movement would soon be established on a substantial basis, scores of people have asked:

"When and how will these aeronautic activities start? Will these activities start on time this year to partly fill the gap in the aeronautic industry caused by the cancellation of war orders?"

The extensive use of aircraft for sport, pleasure, aerial mail carrying and aerial transportation of express and passengers are some of the most substantial developments to be expected in the United States this year.

Latin-American Missions coming to Air Contests and Aeronautic Convention.

Lack of time in which to get here prevented the Latin-American missions from coming to the United States for the present exposition. But they will be here for the Contests and Aeronautic Convention to be held in May. The twenty Latin-American republics need aircraft for their military and naval schools as well as for aerial transport of mail, passengers, express and products. There the aircraft promise to solve difficult problems of transportation. These problems are also to be discussed at the convention in May, and the Latin-American commisisons will be given the opportunity to see in flight the aircraft which are to solve the problems under discussion.

Remarkable Opportunities

"Permit me to urge that you bring to the attention of the country the fact that today aeronautics offers even greater possibilities than the railroad field did to the Vanderbilts, Harriman, Hill, and other great railroad builders. The world is ready for aerial transportation and the men whose foresight leads them to put their efforts in establishing air lines will find aeronautics to offer greater possibilities than were offered by any other line of human endeavors."

Thus Rear Admiral Peary, one of the energetic and progressive leaders of the aeronautic movement, summarized the splendid prospects for the employment of aircraft for transportation and other utilitarian purposes in his message to the Aero Club of America last week.

Like Mr. Alan R. Hawley, the progressive president of the Aero Club of America, and Mr. Henry A. Wise Wood and Admiral Fiske, Admiral Peary is in a position to know the exact status of American aeronautics. To these men, who have so ably led the American aeronautic movement in the past eight years, the country turns for advice and leadership. We know that the daily time of these able leaders is occupied by the hundreds of people who are becoming interested in the aeronautic movement from different standpoints and who go to these leaders for advice and guidance.

Their expressions of opinion are based on knowledge of public interest in aeronautics as well as on years of experience and sound judgment.

Their leadership and foresight was proven wise and sound in the past years and their efforts in training hundreds of aviators at private expense in 1915, 1916, 1917 gave the United States Army and Navy 300 aviators who were the first to be sent overseas, where they gave a good account of themselves.

These leaders have been the people who have maintained an optimistic attitude regarding the immediate future of American aeronautics during the past few months, and have prevented the spread of pessimism which was rampant for a time.

172 Orders for Aeroplanes Secured by an Aerial Age Advertiser

We see a great many evidences of public interest in aeronautics. One of the most forceful evidences was the experience of a manufacturer, an Aerial Age advertiser, who received 172 "line" inquiries from prospective buyers of aeroplanes in response to his advertisements in Aerial Age and *Flying.*

Some of these inquiries are from aviators who have left the service; some are from people who would like to use the planes for pleasure and transport in the United States; some are from South and Central America and Canada. A score are from substantial business concerns who desire to secure the agency for this type of aeroplane.

This is only one of scores of similar indications of the fact that public interest exists and we only need proper impetus to start American aeronautics on a substantial basis.

LIQUIDATING 24,000 CONTRACTS

MAJOR GENERAL CHARLES T. MENOHER, Director of the Air Service, in his message to the Aero Club of America said, in part:

"On assuming charge of the Air Service I find the following conditions existing: Due to the signing of the armistice and to the orders to demobilize as rapidly as possible, the Bureau of Aircraft Production is engaged in the cancellation and settlement of some 24,000 contracts, agreements, and so forth, of all kinds, and the disposal of a large amount of surplus material on hand—in fact, in a general liquidation of its business. The policy being pursued in this matter is to settle these contracts as rapidly and as liberally and equitably as is possible, consistent with the interests of the Government; and to dispose of surplus property and material at as a good a price as possible, but gradually, so as to disturb the market in any commodity that is offered for sale as little as possible. Although the best talent in the Bureau is now engaged on this work, it all takes much time."

A report from Washington states that aircraft contracts aggregating $468,847,993 have been cancelled by the War Department. The cancellations were distributed as follows:

Engines and spare parts	$250,107,551
Planes and spare parts	163,231,790
Chemicals	13,181,285
Balloons and balloon supplies	9,877,356
Instruments and accessories	9,864,238
Fabrics, lumber and metals	5,954,726
Miscellaneous	16,631,047
Total	$468,847,993

Altogether 20,147 Liberty motors have been produced, and 331 are still on order. When the armistice was signed there were 30,526 on order, and since that time contracts for 23,622 of these have been cancelled. From November 11th to February 7th deliveries totalled 6,573, distributed as follows: Nordyke & Marmon Co., 548; Ford Motor Company, 897; General Motors Corporation, 927; Packard Motor Car Company, 1,473, and Lincoln Motor Corporation, which was built with Government money specifically for the production of Liberties, 2,728.

Exclusive of 204 shipped without motors, the United States had produced 4,600 Haviland 4s. There are still 42 on order. Deliveries between November 11th and February 7th were 61 from the Standard Aircraft Corporation, 631 from the Fisher Body Corporation and 681 from the Dayton-Wright Aircraft Company.

May Sell Surplus Property in Adjustment of Contracts for War Supplies Without Reference to Sales Director

The War Department publishes the following supply circular issued by the Director of Purchase, Storage and Traffic:

"The bureaus of the War Department are hereby authorized to sell without further reference to the Director of Sales, any surplus property covered by the act of July 9, 1918, and War Department Bulletin No. 1, 1919, provided:

"(a) That the sale or agreement to sell is made as an incident to the contract for war supplies or the settlement of such a contract which has been suspended or reduced, and has the approval of such contracting officer, board, or higher authority, as may be required to approve such contracts or settlements, and

"(b) That the proper sales officer or board of the bureau shall be consulted as to the terms, conditions, and advisability of the sale or agreement to sell.

Full Report Required

"A full report shall be rendered to the Director of Sales, office of the Director of Purchase, Storage and Traffic, immediately upon the completion of each such sale, showing the character of the property sold, to whom sold, the price received therefor and the purpose for which sold.

"It is believed to be of advantage to the Government in the settlement of any contract to have the contractor retain as much as possible of the property involved, provided he will take it at a fair price. Any property that can not be disposed of in this way becomes surplus and should be turned over to the Director of Sales for disposal. The Director of Sales is at all times ready to take over and dispose of such property if the contractor will not pay a fair price for it, and it is not the policy of the department to sell property to contractors who are known to intend to market it, or contractors who take it for speculative purposes and not for their own use."

Regulation in Bulletin No. 1

The regulation in War Department Bulletin No. 1, 1919, mentioned in the foregoing, is as follows:

II. Sale of surplus property acquired since April 6, 1917.—Section V, Bulletin No. 50, War Department, 1918, is rescinded and the following substituted therefor:

The following extracts from an act of Congress and the regulations for carrying the same into effect are published to the Army for the information and guidance of all concerned:

1. An act making appropriations for the support of the Army for the fiscal year ending June 30, 1919 (approved July 9, 1918):

* * * * * * *

SALE OF WAR SUPPLIES.—That the President be, and he hereby is, authorized, through the head of any executive department, to sell, upon such terms as the head of such department shall deem expedient, to any person, partnership, association, corporation or any other department of the Government, or to any foreign State or Government, engaged in war against any Government with which the United States is at war, any war supplies, material, and equipment, and any by-products thereof, and any building, plant, or factory acquired since April 6, 1917, including the lands upon which the plant or factory may be situated, for the production of such war supplies, materials, and equipment which, during the present emergency, may have or may hereafter be purchased, acquired, or manufactured by the United States: *Provided further,* That sales of guns and ammunition made under the authority contained in this or any other act shall be limited to sales to other departments of the Government and to foreign States or Governments engaged in war against any Government with which the United States is at war, and to members of the National Rifle Association and of other recognized associations organized in the United States for the encouragement of small-arm target practice: *Provided further,* That a detailed report shall be made to Congress on the first day of each regular session of the sales of any war supplies, material, lands, factories, or buildings, and equipment made under the authority contained in this or any other act, except sales made to any foreign State or Government engaged in war against any Government with which the United States is at war, showing the character of the articles sold, to whom sold, the price received therefor, and the purpose for which sold: *Provided,* That any moneys received by the United States as the proceeds of any such sale shall be deposited to the credit of that appropriation out of which was paid the cost to the Government of the property thus sold, and the same shall immediately become available for the purposes named in the original appropriation.

* * * * * * *

2. *a.* Bureaus of the War Department desiring to sell any war supplies, material, or equipment, or by-product thereof, or any building, plant, or factory, including land upon which such plant or factory may be situated, embraced within the provisions of the act of July 9, 1918, shall secure the approval of the Director of Sales, office of the Director of Purchase, Storage and Traffic, Purchase, Storage, and Traffic Division, General Staff, except in the Philippine and Hawaiian Departments, where the authority of the department commanders is sufficient. The foregoing does not apply to property under the jurisdiction of the American Expeditionary Forces.

b. Upon receipt of such approval from the Director of Sales, office of the Director of Purchase, Storage, and Traffic, given either specifically or by general authorization, such supplies, material, equipment, by-products, buildings, plants, or factories, including land on which plants or factories may be situated, will then be disposed of, unless otherwise authorized or directed by the Director of Sales, office of the Director of Purchase, Storage, and Traffic, for cash at auction, or to the highest bidder on sealed proposals, on due public notice, and in such market as the public interests require.

c. The proceeds of sales shall be deposited to the credit of that appropriation out of which was paid the cost to the Government of the property thus sold, and the same shall immediately become available for the purposes named in the original appropriation.

3. These regulations supersede all previous regulations, authorizations, or instructions, either special or general, heretofore issued on this subject.

4. Authorizations of sales in conformity herewith heretofore made by the Director of Purchase, Storage, and Traffic are ratified and confirmed.

[400.32, A. G. O.]

BY ORDER OF THE SECRETARY OF WAR:

PEYTON C. MARCH,
General, Chief of Staff.

OFFICIAL:
P. C. HARRIS,
The Adjutant General.

THE NEWS OF THE WEEK

Flies from N. Y. to Washington in 85 Minutes

Lieut. Frank H. Harmon, pilot, of Bolling Field, Anacostia, established the record flight from New York to Washington by aeroplane.

He lowered all previous records by more than 30 minutes in landing at Bolling Field 85 minutes after his "take-off" at Hazelhurst, N. Y. The machine used was a La Pere fighter.

New Record Flight from Washington

Captain Roy N. Francis made a record-breaking air voyage, carrying four passengers, from Washington to New York, February 18, in 2 hours and 15 minutes, which, for the 240 miles, made the speed nearly 107 miles an hour.

Better time has been made between the capital and New York by single-passenger or two-passenger ships, but this flight was the swiftest ever made by a group as large as five. Col. E. R. Hertz, commanding officer at Bolling Field, Washington, was one of the passengers and got his first view of New York from the sky.

The ship was a twin Liberty Glenn-Martin bomber, and Capt. Francis flew it to New York to the Aeronautical Show.

Kenly Commands Airmen

The War Department authorizes publication of the following General Order issued by Major General W. L. Kenly, Director of Military Aeronautics to the Officers and Enlisted Men of the Air Service:

"It seems fitting at this time to express my appreciation of the splendid work performed for the past year or more of war activities by the officers and enlisted men of the Division of Military Aeronautics. Many of you are now returning to civil pursuits with the regret that you were not among the more fortunate ones who experienced actual service overseas. To you who have labored night and day, undertaking hazardous duties in all weather, that the training of our fighting air men might continue without interruption, I express my sincere thanks for your steadfast devotion to a duty which so suddenly became apparent would involve little hope of commensurate reward. The interminable grind of performing the same hazardous duties over and over again in order that others less experienced might be fitted for the work in hand, and then to have your former students sent to the front while you 'carry on,' requires a quality of pluck and steadfast determination which the fortunate few who have never experienced such heart-rending disappointment can never understand.

"To those who serve overseas and return to this country with the satisfactory feeling of difficult duty well done, I offer my sincere congratulations for your worthy accomplishments.

"For those who met an untimely end in our service I am sure we all hope that they may receive the reward they so justly merit for the extreme sacrifice."

Navy Asks for Seaplane Bids

Washington, D. C.—The Bureau of Steam Engineering of the Navy Department has invited bids from various aircraft manufacturers for the construction of four experimental twin-motored seaplanes and the preparation of blue prints and compilation of performance data. It is anticipated that the newly designed flying boat will show considerably improved performance over the present model of large flying boat. The motive power is to consist of two 400 H.P. motors. Controls are to be provided in both cockpits of the nacelle so that the two pilots may relieve each other. Armor will protect the pilot from fire from all directions, including from astern. The total weight of the complete machine will be between 8,000 and 9,000 pounds, including about 3,000 pounds of useful load.

Toronto-Hamilton Air Line to Be Opened Soon

A passenger, freight and mail service by aeroplane is to be put into operation soon between Toronto and Hamilton, Canada, it was announced in New York by one of the syndicate who recently bought from the British Government aeroplane equipment which remained in the Dominion after the war.

This air route is to be the first of many being planned for the near future. It is a test service, in order that the operating cost of regular air lines and their general feasibility may be determined.

Marjorie Stinson, sister of Katherine Stinson, is an expert pilot, and has served Uncle Sam in one of the drafting departments of the Navy Department

Army Aviator Makes Record Flight in Delivering Glenn Martin's Plane for Aero Show

New York, N. Y.—Captain Roy N. Francis, who is in charge of the Army's plans for the trans-Atlantic flight, carried four passengers in two hours and fifteen minutes, which is an average of nearly 107 miles an hour. This is the fastest time made in a plane carrying five persons for this trip.

The ship used was a Glenn-Martin Bomber and was the first part of the thirty-odd planes to arrive for exhibition at the Aero Show.

Captain Martin has had more hours of flying than any other aviator in Government service. After directing the setting up of the plane at Madison Square Garden, Captain Francis will return to Washington in connection with his duties in arranging for the trans-Atlantic flight.

Flying Cadets Entitled to $100 Per Month to June 30

A recent decision of the Comptroller of the Treasury is to the effect that cadets who were in training for commissions in the Air Service from April 1 to June 30, 1918, should have been paid at the rate of $100 per month under the Appropriation Act of June 15, 1917.

The Director of Finance has authorized, under arrangements with the Auditor for the War Department, to settle these unpaid accounts of cadets on supplemental final statements. This holds in the case of all cadets who have been subsequently discharged or commissioned, or both. Settlement will be made in this manner not only for the difference in pay before July 1, 1918, but also for the 50 per cent. increase of pay for flying duty subsequent to that date.

The necessary forms to be filled out in getting settlement for these unpaid accounts will be furnished on application to the Director of Finance, 3202 Munitions Building, Washington, D. C.

Communications on this subject should not be addressed to the Director of Military Aeronautics, but to the above address.

Aeroplane Brake Project

An invention which the firm claim will revolutionize the aircraft industry has been patented by the Navarro Aviation Co., Ltd., of Burton-on-Trent. It is a rudder air-brake which Mr. Navarro states can be used in flight as well as on landing to slow a machine down and thus prevent accidents.

Old Manuscripts On Aeronautics On Auction

An important and probably unique collection of very early books on aeronautics, collected in England and now to be dispersed by sale at auction on the afternoons of March 10th and 11th, is on display at the Anderson Galleries, Fifty-ninth Street and Park Avenue, New York.

Though the literature of true aerostation can hardly be said to antedate Montgolfier's first successful experiment, the ancients were continually grasping after some solution of the problem, and as early as the age of Plato, Archytas of Tarentum, we are told by Aulus Gellius, the Latin historian, is said to have devised a flying dove.

The work of earliest date in this collection is therefore a copy of Aulus Gellius. Francis Bacon speculated on the subject in his Silva Sylvarum and Roger Bacon describes methods by which the object may be attained in some of his astrological books. The above and other works of a like character are included in the collection.

With the problem solved successfully in 1783-84, the true literature of flying may be said to take its inception. The present collection contains no less than fifteen works dated 1784, and as many more dated prior to 1790. One of the most interesting and important items is a large scrap book containing rare and early prints, drawings, broadsides, posters, newspapers, etc., dating from 1783, and covering a period of nearly one hundred years, some of the later items dealing with the balloon service of the French during the siege of Paris, 1870-71.

Judge K. M. Landis, his son, Capt. Reed Landis, and Mrs. Landis. Captain Landis has just returned from France, where he downed 12 Germans

Sergt. Connelly Returns an Ace

Philadelphia, Pa.—The Guaranty Trust Company announces that Sergeant James A. Connelly, of the Philadelphia office of that company, has returned after nineteen months with the French aviation corps. He is credited with having brought down fourteen Hun planes, and having taken part in sixty-five air battles. He downed seven German planes by official count and seven are reported unofficially. Connelly received the Croix de Guerre with seven palms and a gold star, and the Medaille Militaire. Sergeant Connelly was also cited in official despatches from the front in Italy as a pilot of unusual adroitness.

Control of Craft by Radio Proved

Washington.—Army and navy experts have reported favorably on the device of John Hays Hammond, Jr., for radio control of surface craft to be sent laden with explosives against enemy ships. They predict similar results with submerged craft showing above water only wireless attennæ.

Results of tests were made public in connection with the new fortifications appropriation bill, which carries $417,000 for construction of an experimental submerged boat.

Secretary Baker wrote to the House Appropriation Committee, which is considering the bill, that the joint Army and Navy Board was "convinced of the practicability of the control" of the surface craft, and added that there had also been demonstrations of the possibility of the control to a craft, completely submerged, except for an air intake pipe.

Before finally deciding on the purchase of the patents for $750,000, the board desires further experiment with the submerged craft and a change in law for the experiments is necessary to permit building so as to make success certain before purchase.

Construction of the submerged craft, which will be about 80 feet long, by 7 feet in diameter, will take two years, according to Mr. Hammond, who told the committee he has spent ten years and $400,000 on his invention.

"There is no question whatever as to the ability to control with great accuracy the torpedo or carrier, whatever kind it is," said a letter to Major-Gen. F. W. Coe, a member of the board, "so long as it is a surface vessel or has any antennae above the water, by direct radio waves, either from shore or from aeroplane.

"The board had before it also, and considered, the ability of the enemy to interfere with the control of the vessel by radio energy. Mr. Hammond's claims are that no interference can be had with the craft outside a radius of 100 to 250 yards from the source of the energy; that is, from the radio plant of a battleship, for example.

"Within such a radius a certain interference from a powerful wireless station is possible, but that interference with the apparatus only operates to keep the torpedo on a fixed course on which it may be running."

With a shore station having a height of eighty feet above sea level radio control of the craft has been demonstrated to the board up to a distance of about seven miles. But Gen. Coe said that if controlled from an aeroplane there was no limit as to distance except the propelling power of the torpedo or the boat that carried it or the aeroplane.

"A surface launch with the apparatus on it," said Gen. Coe, relating demonstrations before the board, "was controlled from both the shore and from an aeroplane, the means of control in each case being the same. The board also witnessed the dropping of depth charges from the stern of the boat while it was proceeding on any desired course."

Gen. Coe said he had run the craft "all around vessels coming into the harbor at will," and at close ranges there would be no difficulty in ramming a vessel from shore.

Mr. Hammond said an aviator after four hours training on control was able from a height of 9,000 feet and a distance of six or seven miles to exercise absolute control over the high speed boat.

"World's Greatest Flying Circus" at Rockwell Field to be an Annual Event

Rockwell Field, in its "World's Greatest Flying Circus," held at the field on North Island in San Diego Bay on February 2, instituted what promises to be an annual ocurrence that will supplant in popular favor the time-honored sawdust ring, annual football games, Mardigras, and every other fete that makes its yearly round.

By permission of Lieut. Col. Harvey Burwell, Commanding Officer, the entire field and its equipment were turned over to the use of the circus. As the Rockwell Field *Weekly Flight* puts it: "Hundreds of intrepid aviators, in the roles of circus men, risked their lives in the performance of the most spectacular feats known to the flying game; the 'big top' was limited only to the cloud-flecked sky; huge battle planes were the horses ridden; and the god of chance was the ringmaster. A capable director he proved, too, for not an accident happened to mar the entire flying program." There were sham battles and all the strategic moves of aerial warfare, both in single encounter, pursuit and formation. Parachutes were dropped from aeroplanes, and a captive observation balloon, brought from the Arcadia Balloon School, demonstrated parachute drops from the basket of its big "cigar."

The concessions or side-shows of the circus were novel and aeronautical. A shooting gallery had small aeroplanes for targets and a sign read, "Get five planes and become an ace." Near by was a tent where one could get "flying instructions" for a quarter of a dollar. Over at another booth a sign read, "Are you physically fit to fly 30,000 feet in the air, with both feet on the ground? Come in and try." In another booth many talked over the new wireless telephone. These are but samples of the many. Old-fashioned Southern barbecued meats, cooked over wood coals, were served in some of the booths, and in others fake cabaret stars danced and sang.

The crowd came by train and by motor, and, despite threatening weather, was one of the largest San Diego has seen. For most, it was their first close-up view of Rockwell Field. All were amazed at the extent of the improvements, at the buildings, the paved streets, the splendid flying field, the equipment, and the ability and discipline of the men. It was the first time in more than twenty months that the general public had been permitted to make an inspection of the aeronautical shops. Each department of the flying school gave, as part of the day's entertainment, lectures on its own work. Experts explained the various types of motors, guns and planes; and every piece of machinery was, besides, well placarded to show its particular use.

The climax of the day, however, was not in the circus itself. It was instead a replica of what has taken place many times on the battle front in France, with full military ceremony. This was the presentation of the Distinguished Service Cross to Major Carl Spatz and of the Croix de Guerre to Major Kenneth Marr. The presentation was made by Colonel H. H. Arnold, District Supervisor of the Western District of the D. M. A. The Quartermaster General had been directed to have the cross for Major Spatz sent to the Commanding Officer of the field, and the Secretary of War had directed that upon its receipt it be presented with appropriate ceremonies. The citation of Major Spatz for extraordinary heroism during the St. Mihiel offensive, September 26, 1918, has already been published. This was read at the presentation, as was also an order from the headquarters of the French armies of the east citing Major Kenneth Marr for the Croix de Guerre and describing him as an "excellent squadron commander of a legendary bravery, who has been a beautiful example for his entire unit."

A subsequent feature of the program was a presentation of medals to the Boy Scouts of Coronado.

Rockwell Field lays not a little of the credit for the success of the day to the work of the nine bands that played continuously. These bands were from the Balboa Park Naval Training Station, Camp Kearny (three bands), Rockwell Field, Naval Air Station, Fort Rosecrans, and the Section Naval Base.

Among the distinguished visitors at the circus as guests of Lieut. Col. Burwell were Major Gen. Guy Carleton, commanding Camp Kearny; Rear Admiral William Fullam, commander of the reserve force, Pacific fleet; Glenn Martin, vice-president of the Wright-Martin Aircraft Corporation; Col. Henry H. Arnold; Lieut. Commander E. W. Spencer, commander of the naval air school, North Island; Brig. General W. C. Short; Colonel Guy Rowe; Colonel J. R. Pourie, commander of the seacoast defenses of San Diego; Captain Arthur McArthur, commander of the naval training camp, Balboa Park. Most of these officers were accompanied by their wives; and Mrs. Newton Baker, wife of the Secretary of War, and Mrs. William Kenly, wife of the Director of Military Aeronautics, were also guests of the commander.

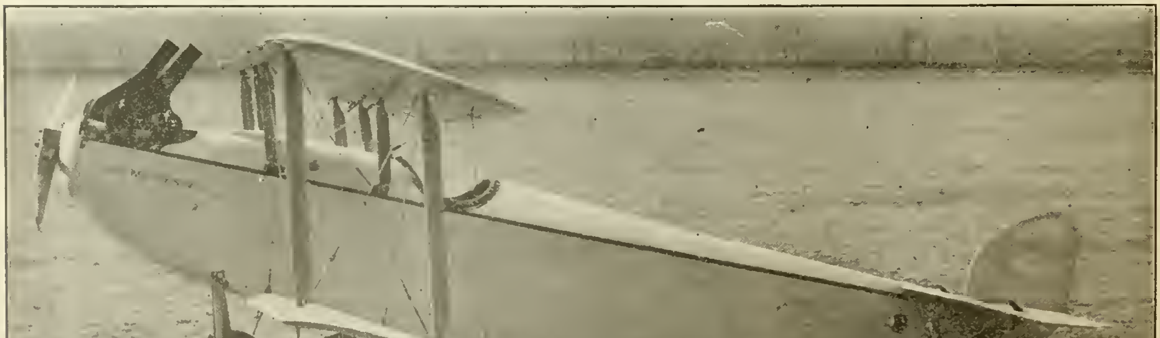
The net profit of the circus was set down as $4,742. This is to be devoted to the Rockwell Field Athletic Fund and to the expenses of the great international exhibition, which it is planned to give at North Island, November 11, 1919, the date set for the annual event.

De Palma Breaks Records With Aero Engine Packard Car

On the beach at Daytona, Florida, Ralph De Palma, driving a Packard special aviation twin six, of 905 cubic inches piston displacement, has strengthened his position as the "Ace" of automobile speed demons.

Under the official auspices of the Automobile Association of America, De Palma thundered off the speediest twenty miles that have ever been covered in an automobile, and brought back the world's speed honors to an American car, whereas most of the former records up to twenty miles had been held by cars of German make.

The new speed marks set up by De Palma are as follows: One mile, 24.02 seconds; two miles, 49.54 seconds; three miles, 1 minute 15.04 seconds; four miles, 1 minute 39.77 seconds; five miles, 2 minutes 4.58 seconds; ten miles, 4 minutes 9.3 seconds; fifteen miles, 6 minutes 48.75 seconds; twenty miles, 8 minutes 54.2 seconds.



The Dayton-Wright "Messenger" Biplane. It has a wing spread of 18 feet 5 inches, weighs 476 pounds net, 636 gross, has a maximum speed of 78 miles per hour, minimum 40 miles, and is equipped with a 37 horsepower motor

Want Roosevelt Cemetery in France

To acquire Belleau Wood from France by purchase or otherwise and convert it into an American national cemetery in memory of Theodore Roosevelt is a proposal that has been laid before the Roosevelt Permanent Memorial National Committee, according to an announcement made by the committee on February 23.

The proposal, first made three days after Col. Roosevelt's death by Miss Agnes Shufeldt, of Johnson City, N. Y., has the idorsement of many of the friends of the late President, including Lawrence F. Abbott, Richard Washburn Child, Arthur F. Cosby, Col. John C. Greenway, John Mitchell, Samuel Parsons, W. F. Purdy and Cushing Stetson.

The suggestion which comes to the committee is that the Belleau Wood, already called by the French "the Wood of the Marines," be made the final resting place of the bodies of the American dead whose families prefer to leave them upon French soil. The grave of Quentin Roosevelt is close to the Belleau Wood, and it is thought that it would be included in the proposed cemetery.

Italy Honors 2 U. S. Airmen

New York, N. Y.—The memory of two brave American aviators who met death in aerial combat on the Italian front was honored February 23 in the City Hall when their fathers received medals awarded by Italy. The father of Lieut. Coleman De Witt Tenafly received a gold medal, awarded by the King, and the father of Lieut. James Bahl received a silver medal, awarded by General Diaz, the Italian Military Chief. Major-General Guglielmotti, Military Attache of the Italian Embassy, represented the donors. Major F. H. La Guardia and many other aviators attended the ceremony.

Lieuts. Tenafly and Bahl were killed October 27 last when their Caproni plane was attacked by five enemy machines. They put up a desperate resistance and brought down two of the German machines before their own machine was shot down.

First Aviation Attache

Great Britain has taken a new departure in the composition of her diplomatic group in Washington, being the first nation to appoint an Aviation Attache. The first man to act in that capacity will be Brigadier General Lionel E. O. Charlton, now on the way to his post with Earl Reading, who is returning from London.

Military aviation thus takes its place as a separate and distinct service and shares the importance hitherto accorded only to the army and the navy. The appointment of such a functionary for service in Washington is a recognition of the eminent place which the United States occupies in the development of the aeroplane and is evidence of the expectation of further and important advances.

General Charlton, the first man chosen for the post, is a distinguished soldier as well as an authority on aviation, he having been decorated by his own government and also by that of France. In the war he was a squadron commander in the Royal Flying Corps.

Aeroplane to Make 300 Miles an Hour

Paris, Feb. 23.—An aeroplane with a speed of from 200 to 300 miles an hour, which will bring America within a short day's journey of Europe, is the prospect held out by the invention of a French engineer, Auguste Rateau, acording to the *Matin*. The invention of M. Rateau was one of the surprises in store for the Germans which were about to be revealed when fighting ceased.

At the present time without the invention the higher an aeroplane mounts the less power does its engine develop on account of the rarefying of the air. The loss at 15,000 feet, for instance, is 50 per cent.

M. Rateau's device, the paper says, is very simple. It consists of an arrangement by which the exhaust from the engine works a small turbine which compresses the air drawn into the engine to normal pressure so that the engine develops full power no matter what the altitude. As the resistance of an aeroplane decreases enormously at high altitudes, the *Matin* adds, it follows that the higher a machine fitted with the new device mounts the greater will be its speed. This fact, it is declared, was demonstrated by the famous German long-range gun.

It has been found that a heavy day bombing machine whose speed at 15,000 feet ordinarily did not exceed 80 miles an hour made 140 miles an hour when fitted with M. Rateau's invention.

Aeroplanes Used in France for Milk Distribution

Communication from France on February 21 to Mrs. Warren McConihe, president of the New York Committee of Free Milk for France, stated that the crippled condition of the French railroads had made it necessary to distribute the milk throughout Northern France by aeroplane. It is the first time that aircraft have been used in the extension of relief in France, although similar methods were resorted to many months ago in Italy.

Aeroplane in Agriculture

In connection with scouting and other survey work in Texas the United States Department of Agriculture is putting the aeroplane to its first practical application in agriculture. A try-out of this method of survey was made last year along the Trinity River and resulted in the discovery of several outlaw cotton fields in heavy timber, which had previously escaped detection. This year the aeroplane is to be used more extensively. It has been found a valuable aid in pink bollworm work, as it makes possible the easy mapping, by means of photographs, of the quarantined territory, and facilitates the inspection work in forested areas, especially in such long stretches of country as the valley of the Rio Grande and its tributaries.

Admiral Sims Expects Trans-Atlantic Flight Next Summer

Washington, D. C.—Rigid airships in the future will comprise a specific element of the fleet of every first-class naval power, Vice-Admiral Sims said in a wireless message made public February 23 by the Navy Department. The admiral said that observance of the naval lessons of the war had thoroughly convinced him of the importance of these machines and he recommended that the United States lose no time in developing them.

Secretary Daniels included the message in a letter sent to Senator Swanson, chairman of the Senate Naval Committee, expressing the thanks of the department for the favorable report of its rcommendation that $36,000,000 be appropriated for the development and construction of rigid airships.

England is making rapid strides in the new line of military aeronautics, Admiral Sims said, havng already built airshps 695 feet long, with a displacement of 2,700,000 cubic feet, a maximum speed of 59 knots and cruising period of more than 200 hours.

"Following the signing of the armistice," the admiral added, "this programme was so modified as to provide that new construction and development work be pushed even more actively than during the war."

Admiral Sims confirmed printed reports that the British Admiralty the coming summer intends a flight to the United States and return with one of these new ships and declared that the chances are better than fair that it will be successful.

"Without hesitation," Admiral Sims said, "I can recommend on strong military grounds that two more airships of the latest type be started in the United States and that these be followed by at least two more of an improved type for helium gas. This should involve an adequate building and repair base and an operating base to be located later."

Flyers Reach Mobile Enroute to Houston

Mobile, Ala.—The Handley Page aeroplane which is making its first trip from Elizabeth, N. J., to Ellington Field, Houston, Texas, carrying eleven passengers, arrived in Mobile at 12.30 P.M., Sunday, February 23.

The aeroplane left Americus, Ga., Sunday morning at 9 o'clock and made the trip of 252 miles in 3½ hours.

The machine is operated by Lieut. George M. Palmer as pilot, assisted by George L. Bradford. The officers expect to complete the trip by Wednesday. They will leave here at 9 o'clock Monday morning for New Orleans.

Aviators' Clubhouse National Memorial

A club house that is to be a memorial to the American aviators who lost their lives in the great war is to be erected in Washington by the National Aeronautic Committee, No. 289 Madison Avenue, New York, of which Mrs. Charles A. Van Rensselaer is president. The club house will be the home of the Army and Navy Air Service Association, until a few days ago the Air Service Clubs Association.

Mrs. Van Rensselaer made her offer at the meeting at which the association changed its name and admitted many fliers to membership. The association was an army project, having grown out of a plan evolved by Major Maxwell Kirby, who was commandant of Gerstner Field, Lake Charles, La., when Major John Purroy Mitchel lost his life. Now the navy is represented on its Board of Control by Commander John H. Towers, U. S. N., a pioneer airman.

The committee of which Mrs. Van Ransselaer is the head has been active in behalf of the comfort of aviators since the United States entered the war. The first work to which it devoted its energies was the establishment of a balloon training school at Stapleton, S. I. Then it took up the suplpying of athletic sports equipment, and by the time the armistice was signed had outfitted 207 overseas squadrons and had sent complete supplies to 22 training fields in this country at costs ranging from $500 to $2,000.

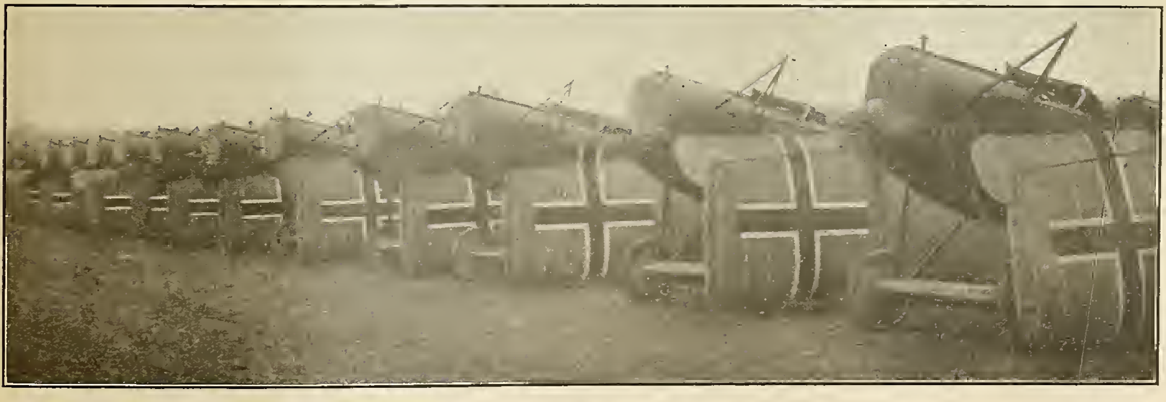
This recognition of the need of athletic sports for men in so hazardous an arm of the service as aviation won the committee the cordial indorsement of officials, among the most approving being Major General W. L. Kenly, Director of Military Aeronautics.

Last fall the committee gave at Belmont Park an Aviation Carnival which was the most spectacular thing of the sort ever seen in the East. In the announcement of the project made by the association it is said:

"One of the principal functions of the association is to bring air service officers closer together for the good of the air service and aeronautics in general. The club house will be for officers of the air service of both the army and navy, either active or discharged, when the best things they have learned in the service of their country can be encouraged and perpetuated."

Board to Review Flying Rewards

Major Gen. W. L. Kenly, Director of Military Aeronautics, has appointed a board of officers to pass upon the qualifications and merits of flying officers who have distinguished themselves in action. The board will review all the records with a view to awarding flying officers such ratings as their achievements warrant. These ratings will carry an increase in flying pay. This action is in recognition of the fact that the list of pilots credited with destroying five or more aeroplanes is incomplete and that officers on details of ten, requiring a greater amount of skill in fighting, deserve recognition in the way of higher rating and appropriate rewards.



A line-up of German aeroplanes turned over to the French under the terms of the armistice

The AIRCRAFT TRADE REVIEW

Wright-Martin Turns Out Combination Liberty-Hispano-Suiza

New Brunswick, Feb. 10.—About 2,000 workmen are still employed by the Wright-Martin Aircraft Corporation on a Government aeroplane engine contract, which will be completed in about a month. It has developed, according to *Automotive Industries*, an aeroplane motor combination of Liberty-Hispano-Suiza, and has a four- and six-cylinder engine completed.

Frank Mossberg Joins Rice Leaders

Attleboro, Mass., Feb. 10.—The Frank Mossberg Co. has become a member of the Rice Leaders of the World Association.

Aeroplane Show for Chicago

Chicago, Feb. 11.—Chicago will hold its first aeroplane show at the Coliseum, March 29 to April 5. Louis Disbrow is the promoter. He and George W. Browne, Wisconsin distributer for Willys-Overland and distributer in Wisconsin and Illinois for Curtiss, have formed the International Airplane Exposition Co., and may put on similar shows elsewhere. Four Curtiss planes are promised for exhibition. Bart J. Ruddle of Milwaukee will manage the show.

Johns-Manville Co. Give 20% Bonus to Employees

In appreciation of the good work of its employees during the strenuous war period, the H. W. Johns-Manville Co. has decided to distribute among all employees who have been in their employ for the full year of 1918, excepting officers of the company, an extra compensation of 20 per cent. on the salaries paid them during the year. This compensation will entail an expenditure of more than $1,000,000.

Motor-Driven Valve Grinder On Market

A new tool, an electric motor driven valve grinder with an oscillating spindle and designed to supplant the laborious hand grinding, has been put on the market. The device is controlled by a trigger similar to the trigger of a revolver. The spindle oscillates with a long, steady sweep similar to the movement obtained in grinding by hand, but many times more rapidly. A 1/6 H.P. motor is used, which is air cooled. It operates on standard power circuits either alternating current with range 25 to 60 cycles or direct current, being made for circuits of 110 volts, 220 volts, and 32 volts.

The motor and gearing with reciprocating mechanism are completely enclosed in an aluminum housing, the gearing and oscillating movement being separated from the motor compartment and packed in grease. The grinding spindle runs in a ball thrust bearing. Armature shaft runs on Norma ball bearings, and gears are mounted on shafts ground to size supported at both ends in long phosphor bronze bushings. Bits are provided to make the tool adaptable to various types of valves.

Personal Pars

R. G. Ames has joined the Black & Decker organization as branch manager of the Chicago office.

Mr. Carroll M. Aument, formerly one of the engineers of the Wright-Martin Aircraft Corporation, has resigned his position and opened a consulting, designing and sales engineering office under the name of Aument & Gillespie, at 87 Nassau Street, New York City.

Lieutenant-Colonel Grayson M. P. Murphy, senior vice-president of the Guaranty Trust Company, who was in charge of the American Aviation Forces in London, has returned to the United States and is back at his desk.

J. J. Tobias is in charge of the new Detroit branch of the Moto Meter Co., Inc., 2019 Dime Bank Building.

C. L. Diers, formerly in charge of the Indianapolis branch of the Goodrich Tire & Rubber Co., Akron, is now in charge of the European division, covering Europe, Asiatic Russia and the northern coast of Africa.

F. H. McFarlin has joined the sales department of the Erie Specialty Co., Erie.

Junior Plattsburg to Have Aviation Ground School

A department of aeronautics has been added to the curriculum of the next Junior Plattsburg, according to an announcement made by E. C. O'Brien, managing director. The course will be similar to that offered at government ground schools, including instruction in the theory of flying, elementary aerodynamics, motor mechanics and structural design. To this will be added military aeronautics, including aerial reconnaissance, aerial photography, map-making, elementary aerial navigation, aerial communication and the theory of aerial gunnery. The courses will be given by experienced aviators and the equipment will consist of 5 JN-4D Curtiss planes, in which the majority of American aviators were trained, and one MF flying boat. A Curtiss OXX motor will be used for laboratory work. Upon completion of the course each cadet, upon authorization by his parents, will be given a practice flight.

Johns-Manville Employees Receive Extra Compensation

Many progressive business organizations have adopted one or another form of profit-sharing plan for employees. Few, however, have shown so great liberality in this respect as the H. W. Johns-Manville Company, miners and manufacturers of asbestos, and allied products, who will distribute to all salaried employees—men and women—from heads of branches and departments to office boys, who have been in continuous service for the full calendar year nineteen eighteen, an extra compensation of 20 per cent on the salaries paid them during 1918.

It has been the custom of the H. W. Johns-Manville Company for some years past to recognize the faithful service of their big business family in this substantial way.

During the past two years especially, the members of this organization, in common with many others, have been working under an exceptional strain, owing to the depletion of their ranks through enlistment and the high pressure of war production.

In appreciation of this fact, the H. W. Johns-Manville Company has at the end of each war-year, 1917 and 1918, set the mark even higher than before—a full 20 per cent of the year's salary.

This extra compensation for 1918 will cost the company approximately $1,000,000.

Represents American Accessory Manufacturers in England

Mr. H. K. Lakin, of the firm of Stanley J. Watson, of London, England, agents for the Eisemann Magneto Co., the Federal Bearings Co., and others, is visiting the United States, and will be located in Room 714, 220 Broadway. He is negotiating with various firms who have been seeking live representation in England for the British agency for American products, and is desirous of extending his connection with the American industry by adding more accessory manufacturers to his clientele.

Honorably Discharged

America's leading "Ace," Captain Edward V. Rickenbacker, A. S. A., who reported at the O. D. M. A., February 10, 1919, was honorably discharged February 13.

The following officers of the Air Service were discharged on the dates noted:

February 10, 1919: Captains William N. Neidig, Clarence G. Spencer, Laurence E. Rubel, Samuel P. Burnam, Daniel C. McCoy, Robert R. McMath, First Lieuts. George H. Pfau, Robert J. Love.

February 13, 1919: Lieut. Col. John A. Drexel, First Lieut. Thomas F. Ward, Second Lieut. Aaron Prussian.

February 14, 1919: Captains David R. Wheeler, Maury Hill; Second Lieuts. Harold Palmer, Edwin S. Ladley, Wallace J. Frost.

February 15, 1919: Lieut. Col. Thomas G. Gallagher, Major Walter G. Rogers, Captains Michael J. Phillips, John McQuerney, Otis S. Van De Mark, Charles M. Neubauer; First Lieuts. William G. Garrett, Edward F. Dean; Second Lieuts. Harry A. Van Horn, John M. Saunders; First Lieut. Lawrence W. Kinnear.

February 17, 1919: Major Charles S. Jackson, Second Lieuts. Thomas H. Owen, William T. Ashby.

February 18, 1919: Captains Leonard C. Hammond, Claude O. Van Valer, Second Lieut. Robert G. Elbert.

New R. M. A.'s

The following officers have been rated Reserve Military Aviators: Second Lieuts. James B. D. Palmer, A. S. A., and Harvey Ashfield, A. S. A., to date from January 30, 1919; and Second Lieut. Walter William Roop, A. S. A., to date from January 18, 1919.

Soon to Return

The following organizations have been assigned to early convoy:

Eighth Aero Squadron.

Photographic Section, Air Service, No. 17.

Photographic Section, Air Service, No. 23.

Lieut. Col. Jacob E. Fickel, J. M. A., A. S. A., Captain George Washington Price, A. S. A., and Captain Louis Montford, A. S. A., have been appointed members of the Board of Contract Review of the Division of Military Aeronautics, created September 23, 1918, vice Lieut. Col. Harold Benington, A. S. A., Captain Otis S. Van De Mark, A. S. A., and Captain Lewis B. Ticknor, A. S. A., relieved.

Lieut. Col. Herbert A. Dargue, M. A., A. S. A., was recently ordered to proceed from Washington, D. C., to Post Field, Fort Sill, Oklahoma; thence to Air Service School for Radio Operators, Penn Field, Austin, Texas; thence to School of Military Aeronautics, University of Texas, Austin, Texas, in connection with an investigation of the facilities existing at Penn Field, for the establishment of a permanent radio school.

A Board of Officers consisting of the following personnel, Col. William N. Hensley, Jr., J. M. A., A. S. A.; Col. James Prentice, J. M. Aer., A. S. A.; Maj. Frank M. Kennedy, J. M. Aer., A. S. A., Commanding Officer, Langley Field, Captain John McInerney, A. S. A., met at Langley Field, Hampton, Virginia, for the purpose of reporting upon the location of a dirigible hangar and making recommendations as to what lighter-than-air activities may be advantageously carried on at that place together with construction required therefor. Col. Arthur L. Fuller, in charge of Lighter-than-Air Training, and Acting Chief of the Training Section, met with the Board at Langley Field.

Captain Roy N. Francis, A. S. A., who was ordered to proceed by aeroplane from Washington, D. C., to Hazelhurst Field, Mineola, Long Island, New York, piloting a Martin bombing machine, made the trip successfully on February in 2 hours and 30 minutes.

Aviators Cited for Promotion

The following twenty American flying officers distinguished themselves overseas and have been recommended for advanced flying ratings, carrying extra pay:

Lieut. Col. William Thaw, Pittsburgh; Major David McK. Peterson, Honesdale, Pa.; Capt. Ed. V. Rickenbacker, Columbus, Ohio; Capt. Reed G. Landis, Chicago; Capt. Douglas Campbell, Mount Hamilton, Cal.; Capt. Edgar G. Tobin, San Antonio, Tex.; Lieut. Louis G. Bernheimer, New York; Lieut. William P. Erwin, Chicago; Lieut. Robert F. Raymond, Newton Center, Mass.; Lieut. Donald B. Warner, Swanstoc, Mass.; Lieut. James A. Keating, Chicago; Lieut. Paul W. Drew, Philadelphia; Second Lieut. Earl W. Porter, Chicago; and the following deceased officers: Lieut. Fred Norton, Columbus, Ohio; Lieut. Edward Orr, Chicago; Lieut. Merton Campbell, Wakeman, Ohio; Lieut. Lloyd A. Hamilton, Burlington, Vt.; Lieut. John O. Donaldson, Washington, D. C.; Second Lieut. Frank B. Bellows, Williamette, Ill., and Second Lieut. Roger Hitchcock, Mount Carmel, Ill.

A NEW PRINCIPLE IN CARBURETION

CONSIDERABLE interest has been shown in the novel design of the Brown Carburetor, which has embodied therein a new principle in carburetors. This device is the invention of one of the older automobile engineers, George M. Brown, of New York.

The absence of all cams, springs, dashpots, and the moving parts is noteworthy, also the tendency to get away from the venturi tube idea, the compactness and neatness of design attracts the eye of the engineer desiring to clean up his power plant.

The correct ratio of air and fuel is maintained at all speeds without the use of adjustments of either fuel or air, this is accomplished automatically for either warm or cold weather operation.

Figure 1 shows a sectional view of the top opening type. "A" represents the only air intake (there being no auxiliary air intakes); "B" is an air baffle plate which has openings in the sides with an area equal to the area of the air intake. The lowest end of this plate is curved in toward the wall of the mixing chamber "C," and has a narrow opening at its lower end. The mixing chamber "C" is spherical in shape and has a fuel nozzle "D" at its lowest point. The height of this fuel nozzle is set at the factory. "E" is the outlet baffle plate which also has openings of a predetermined shape and size at either side; "F" is the throttle valve, and "G" is a choke valve. The gasoline bowl "H" is directly under the mixing chamber "C". "I" is a metal float which controls the depth of the fuel in the bowl and is connected to a shut-off valve "J" through the ferculum arm "K". The shut-off valve "J" is threaded at its middle portion and the fuel can be adjusted by means of the nut "L". "M" is the fuel duct and the fuel enters same from the bowl through the opening "N".

George M. Brown, Inventor of the Brown Carburetor

In operation, air is admitted through the air intake and passes through the side openings of the baffle plate into the mixing chamber and coming in contact with the curved walls of the mixing chamber is caused to travel in a circular direction. The speed of this air is, of course, controlled by the throttle opening and the motor suction at low speed. The action of the air in entering the mixing chamber is such as to draw the proper amount of fuel through the fuel nozzle. This fuel is immediately atomized by the revolving air, the tendency of the incoming air being to create as low suction at the lowest speeds over the fuel nozzle owing to the fact that the greatest air momentum is at these speeds toward the outside walls of the mixing chamber. As the motor speed increases by opening the throttle, the increased volume of air passing through the mixing chamber causes more suction over the fuel nozzle as the increasing volume of air tends to spread out in its path toward the centre of the mixing chamber.

The outlet baffle openings, also, tend to control the air in mixing chamber by the removal of the gas mixture much the same way that the air is controlled by the intake baffle plate. The reason for this is to balance the direction of the air in the mixing chamber. There is a set idling jet for motor idling; this being a nozzle with fixed opening.

Laboratory and road tests have covered all conditions of motor operation, and the automatic action is uniform under all conditions.

Lack of space prevents the publishing at this time performance curves, but we present a memo from a few tests.

A car equipped with a six-cylinder motor 3⅜ bore and 4½ stroke, weighing 3,475 pounds with driver and observer over a fifty mile course, temperature 34° F. made an average speed of 25 miles per hour, consumed gasoline (63 test) at the rate of .233 pounds of fuel per mile, or 22.3 miles per gallon.

Block test with same motor consumed .512 pounds fuel per brake horse-power per hour at 78% full load.

Tests made for fuel leakage to oil reservoir showed that in 78 hours test on road, there was no perceptible change in the oil except that which would occur through the re-use of the oil.

Carbon residue was almost totally absent; especially was this true on top of pistons and heads.

The carburetors are now being manufactured in ¾, 1, 1¼, 1½ and 2 inch sizes by the Brown Carburetor Corporation, with Engineering Offices at 1790 Broadway, New York City.

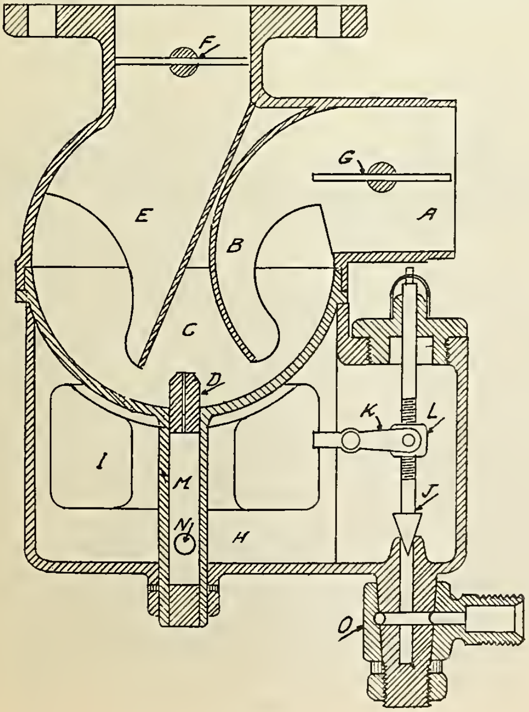
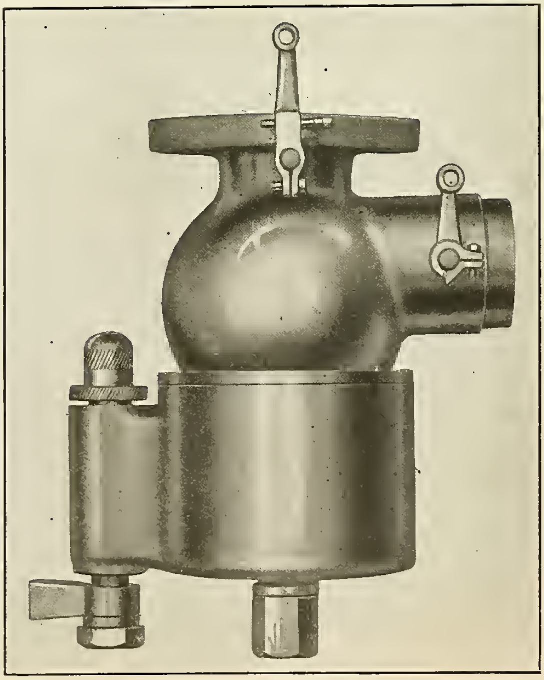
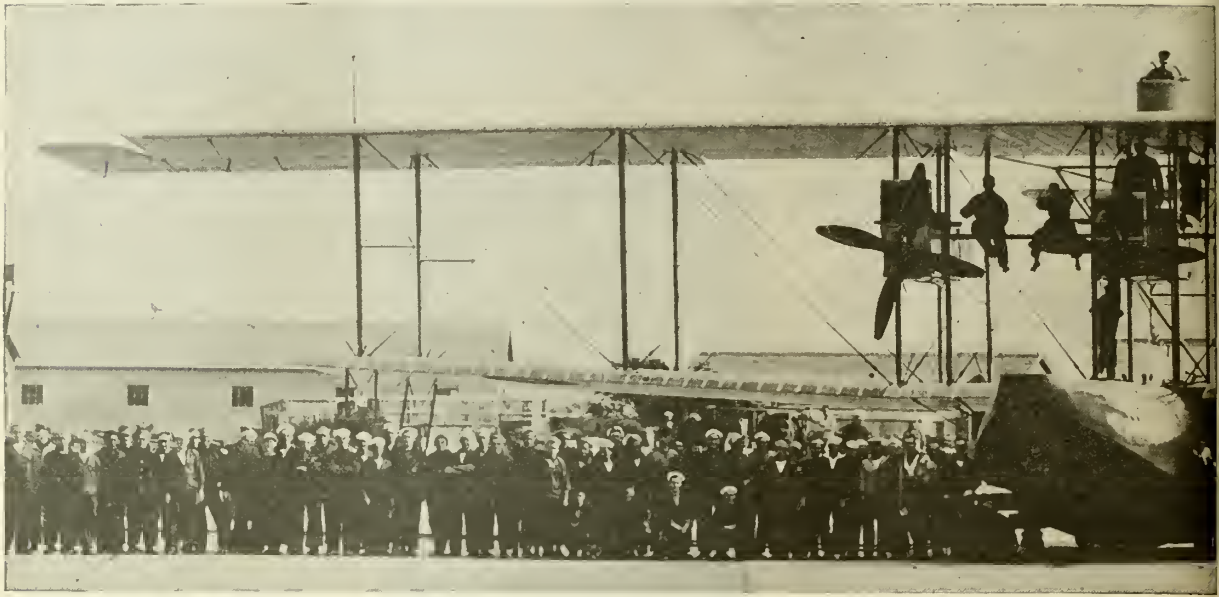


Fig. 1

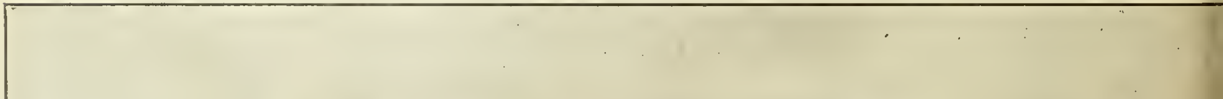


The Brown Carburetor

AMERICAN AEROPLANES

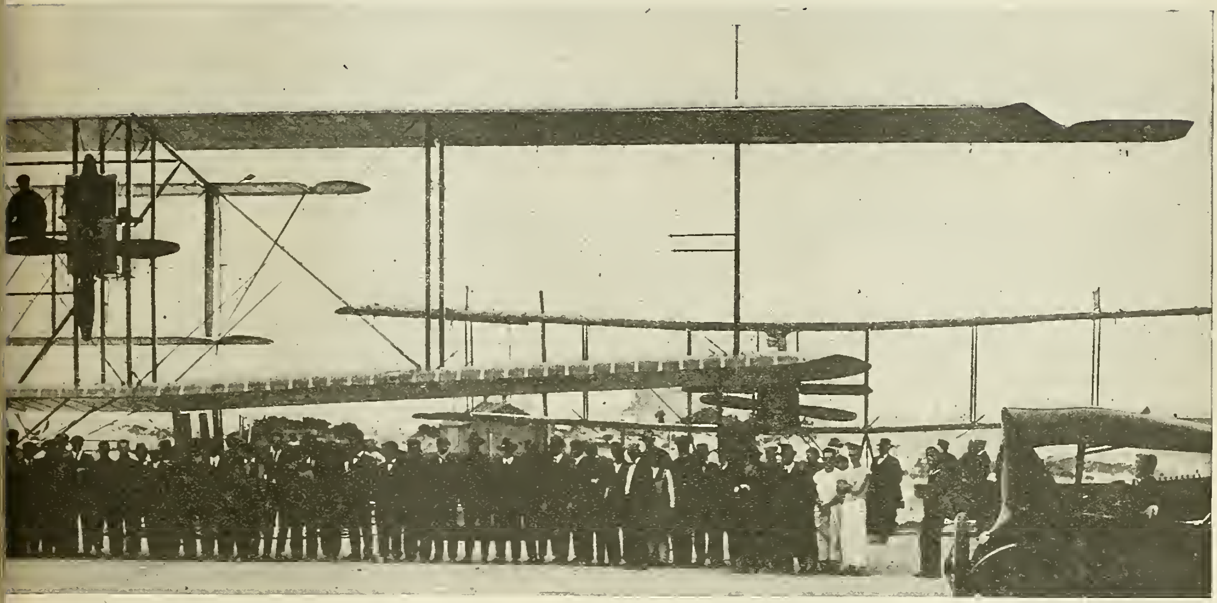


The Curtiss N. C.-1, 3-motored flying boat, which
New York. The Navy Department plans to use this
shortly to cross

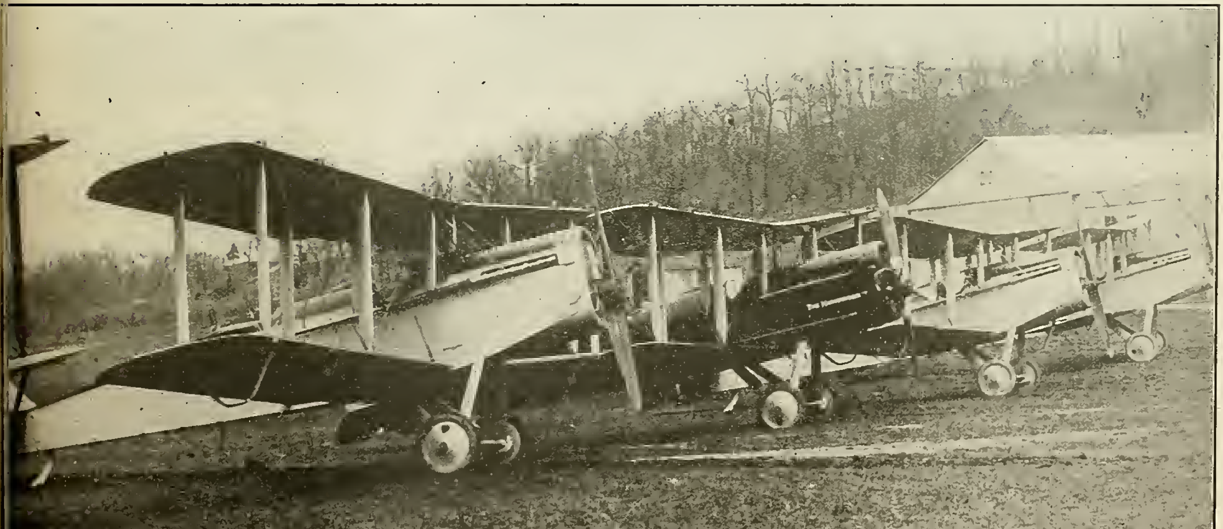


Some of the American De Havilland Planes Equipped with Liberty Motors

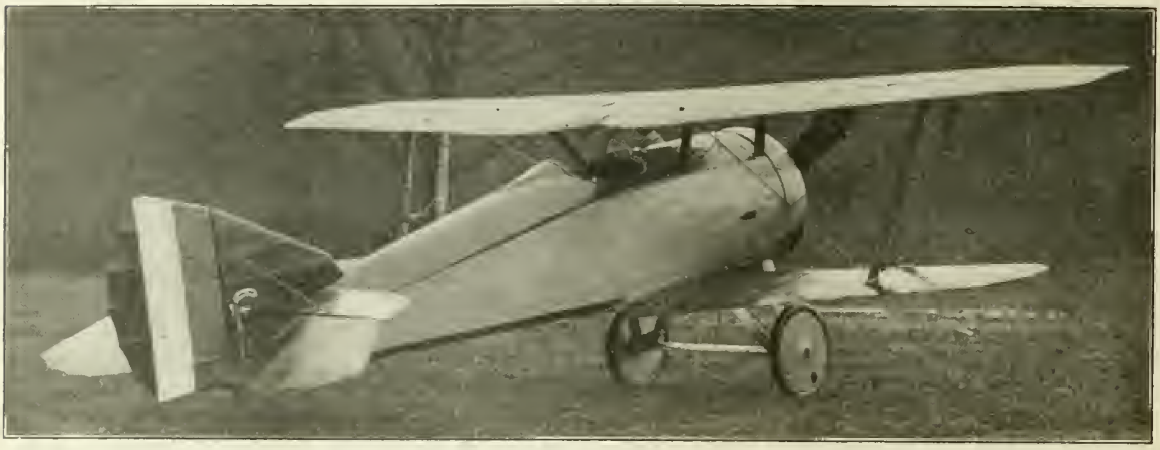
AND SEAPLANES 1918-1919



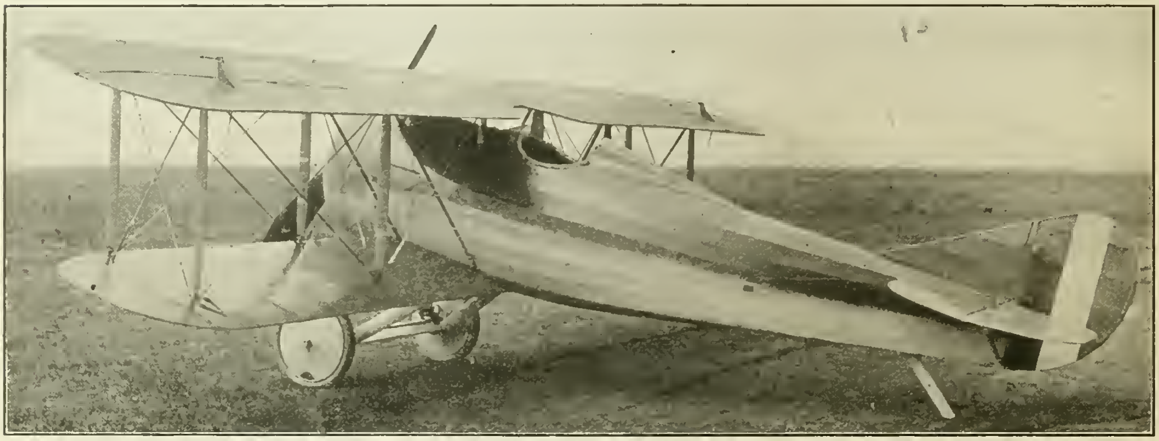
carried 50 passengers on a test flight at Rockaway, type of boat in the attempt which will be made the Atlantic



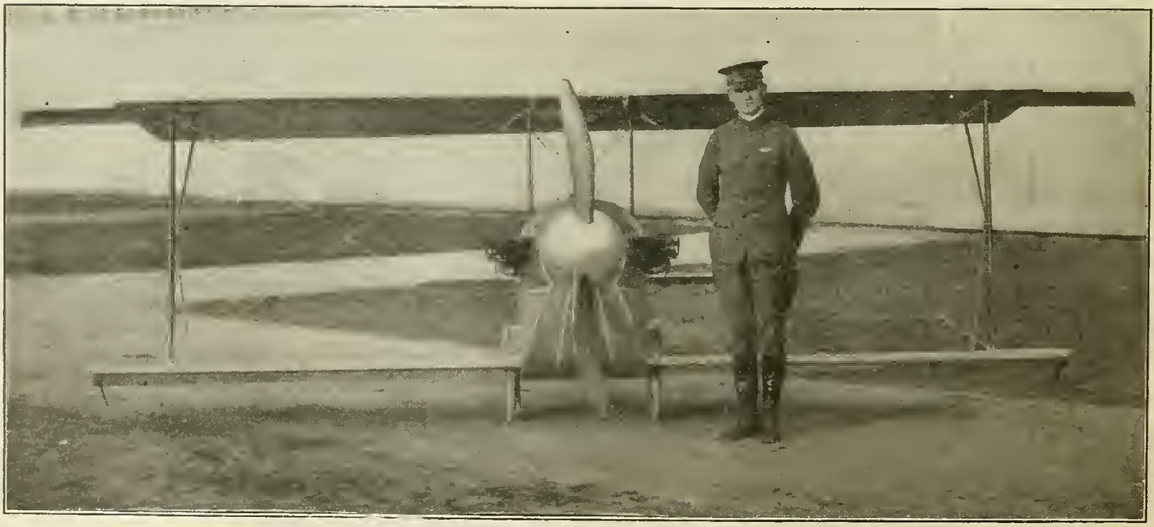
which were active over the German lines when the armistice was signed



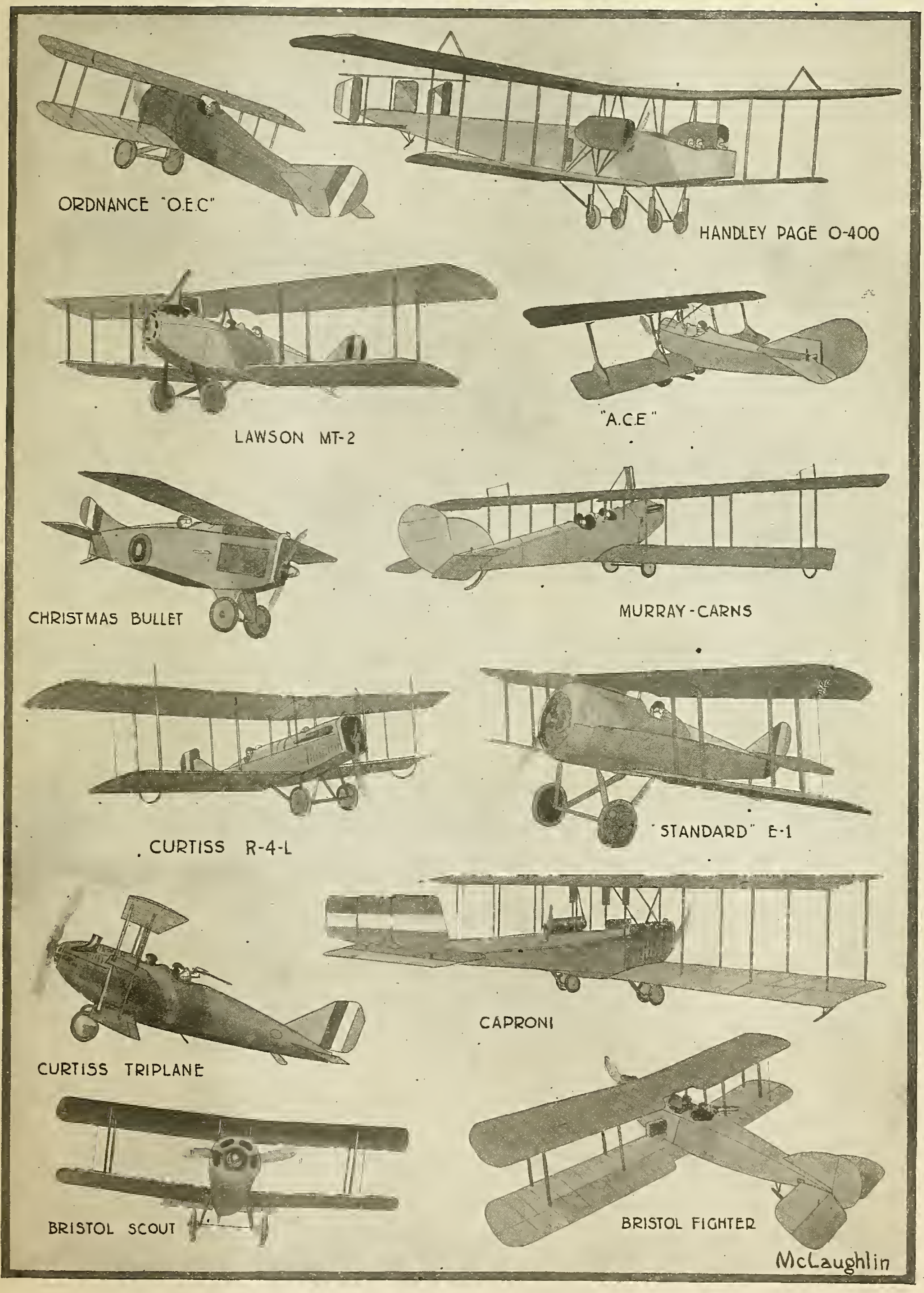
The Thomas-Morse Type S 4-E has a wing spread of 22 feet. It weighs 1,150 pounds and is powered with an 80 horse-power Le Rhone. It has a speed range of 55 to 105 miles per hour and climbs 7,000 feet in 10 minutes, and was designed to furnish the War Department with an advanced training machine



The O. E. C. 80 horse-power Le Rhone training scout, designed and built by the Ordnance Engineering Corporation



The Martin K-III Scout, designed by Captain James V. Martin, powered with an A. B. C. engine, with retractable chassis and wing end ailerons



ORDNANCE "O.E.C"

HANDLEY PAGE O-400

LAWSON MT-2

"A.C.E"

CHRISTMAS BULLET

MURRAY-CARNS

CURTISS R-4-L

"STANDARD" E-1

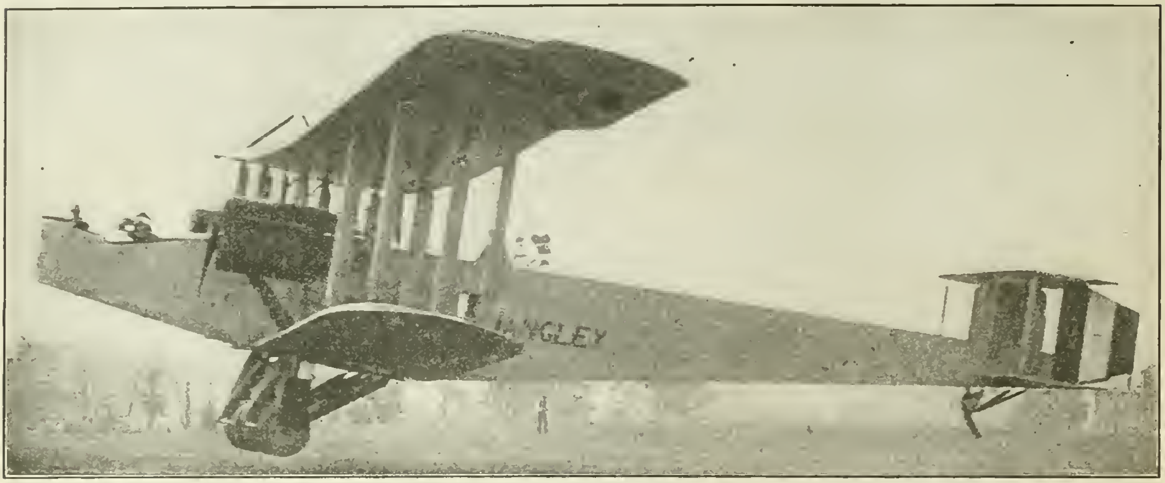
CURTISS TRIPLANE

CAPRONI

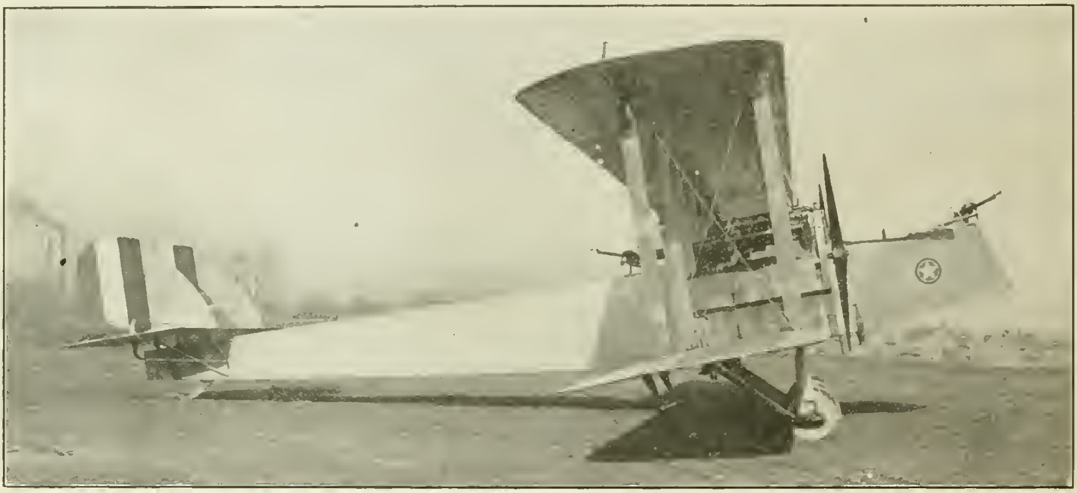
BRISTOL SCOUT

BRISTOL FIGHTER

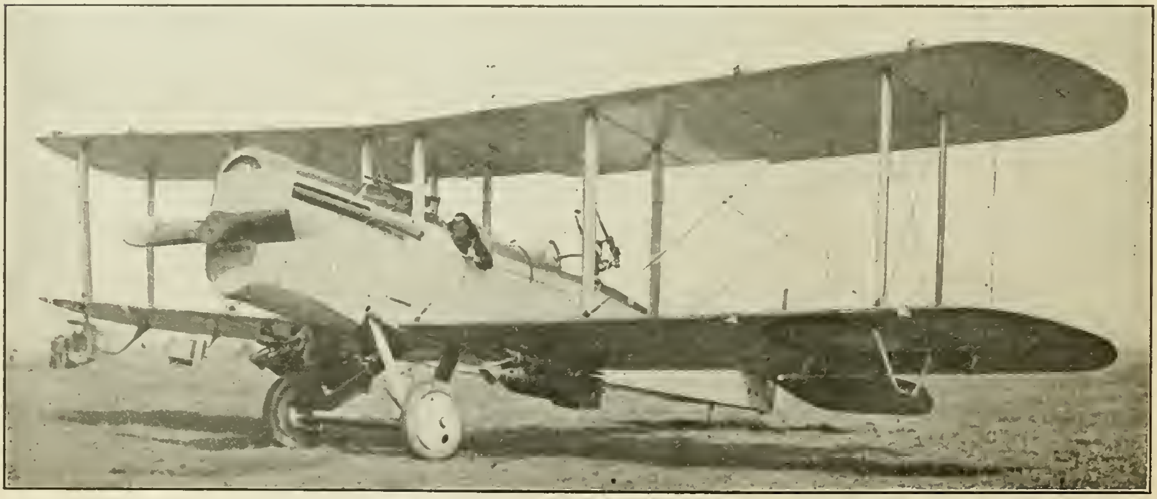
McLaughlin



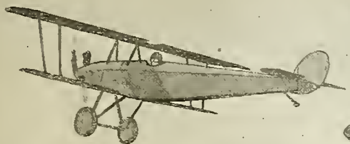
The Handley-Page Bomber, with two Liberty Motors, built by the Standard Aircraft Corporation at Elizabeth

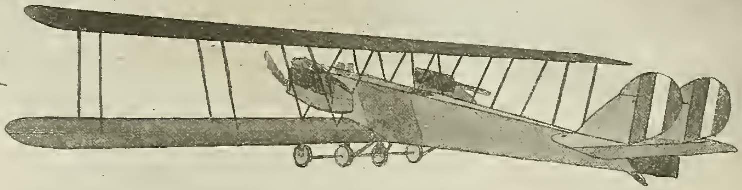


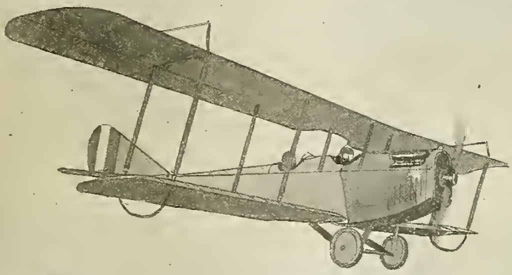
The Glenn L. Martin twin-liberty motored bomber tbat has established several cross country records

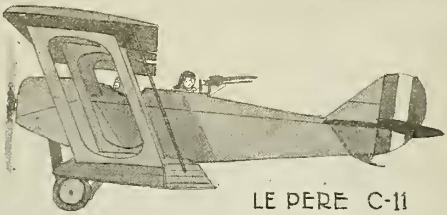


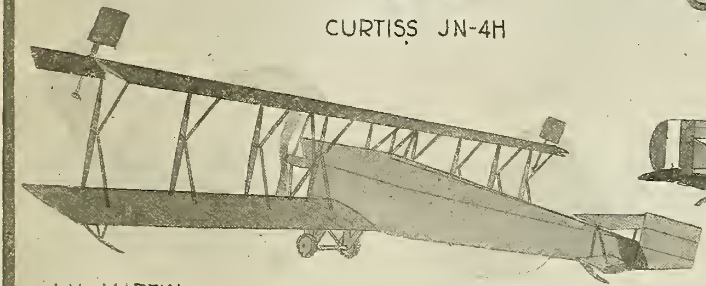
The Liberty-motored De Havilland four, with bomb racks filled for bombing demonstration

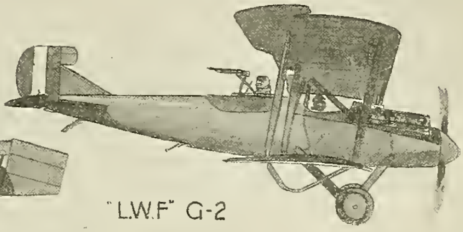

BELLANCA

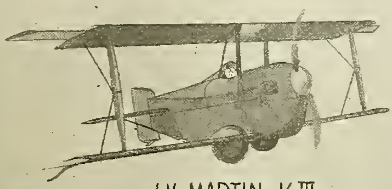

MARTIN BOMBER

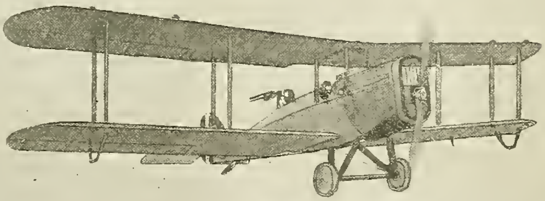

CURTISS JN-4H


LE PERE C-11


J.V. MARTIN


"L.W.F." G-2


J.V. MARTIN K III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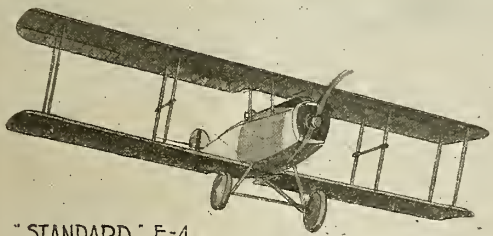
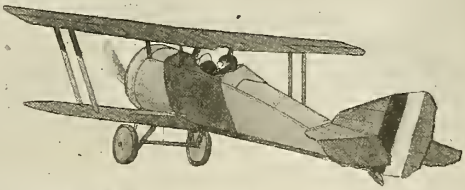
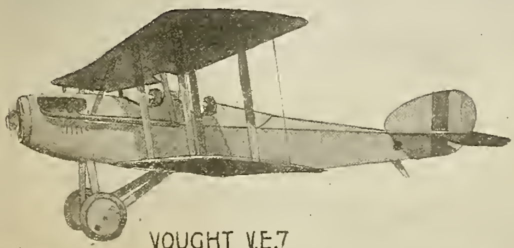
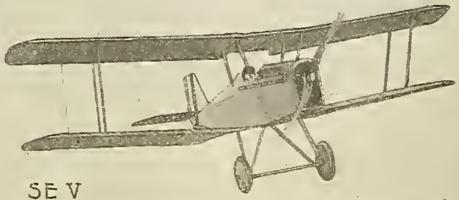

"STANDARD" E-4


THOMAS-MORSE S4-E


VOUGHT V.E.7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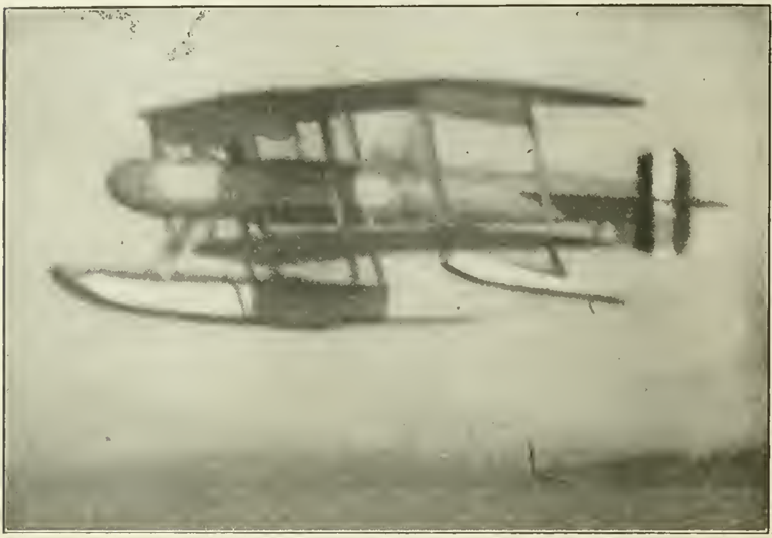
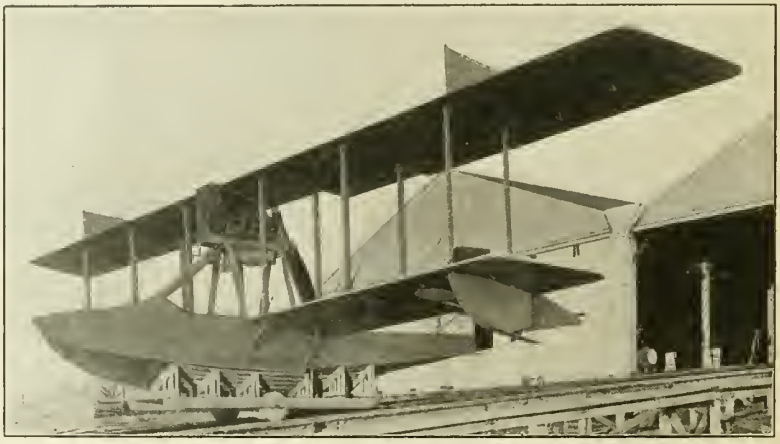


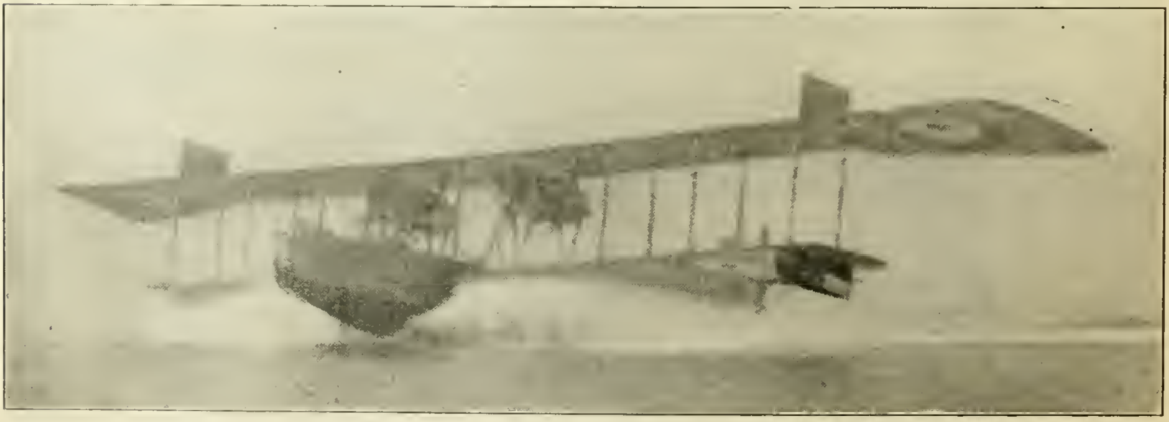
GALLAUDET D-4 BOMBER

The Gallaudet Bomber has a Liberty Engine of 400 H.P. driving a four-bladed pusher propeller. The machine is a two-seater with pilot and observer placed well forward. Fuselage finely streamlined and the placing of the lower wings below the fuselage brings the center of thrust in a very desirable location. A maximum speed of 126 M.P.H. and a climb of 2,100 feet in 2 minutes was recorded in an official test flight

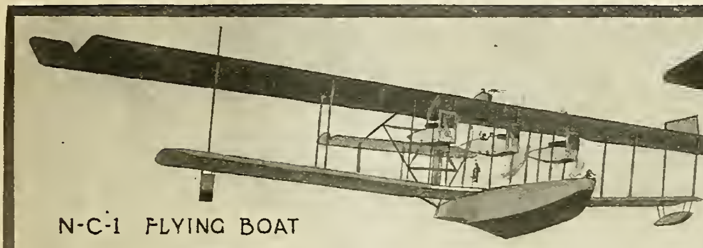
CURTISS MODEL M. F. FLYING BOAT

The Navy Department has employed a great number of the M. F. Boats for coastal training work. Machine is well suited for marine sportsmen for it is comparatively small and is easily handled. The boat is provided with either a Curtiss OX 5 100 H.P. engine or the new Kirkham K-6 150 H.P. six-cylinder vertical engine. The M. F. Boat is an improvement in design over the Curtiss F Boat which found so much favor before the war stopped civilian flying

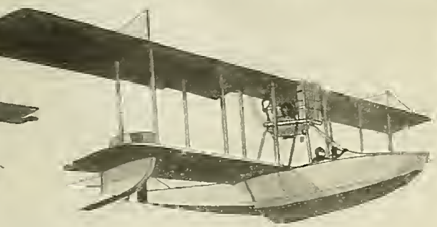




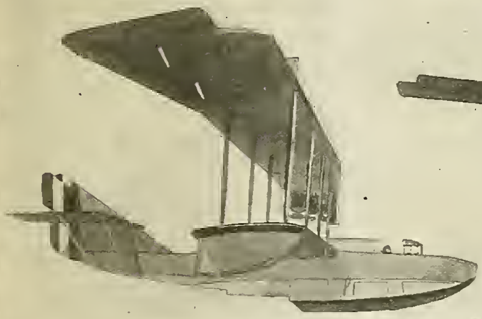
The Curtiss H-16 Flying Boat. The H-16 has two 400 H.P. Liberty Engines. Two guns and a gunner are carried at the bow, and behind them, in an inclosed cabin are the two pilots. In tbe after part of the boat, two guns are arranged to be fired through windows in either side of the hull. Such machines as these were used in large numbers for submarine spotting and long range coast patrol work



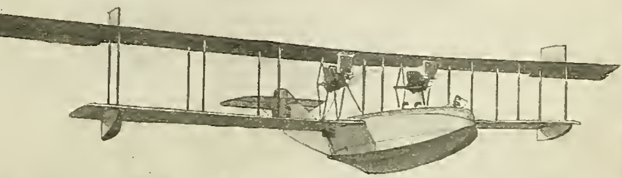
N-C-1 FLYING BOAT



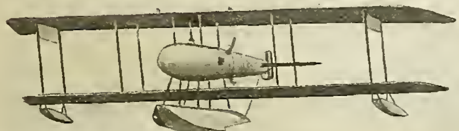
CURTISS M-F



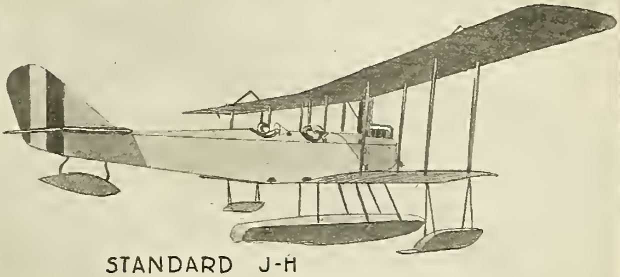
H-16 PUSHER



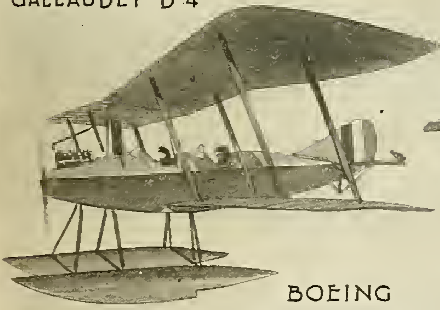
F-5-L FLYING BOAT



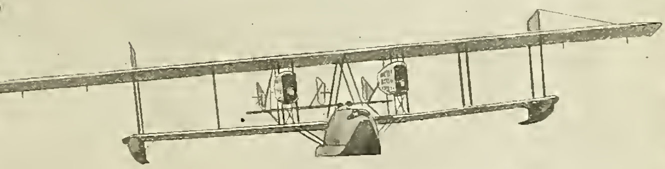
GALLAUDET D-4



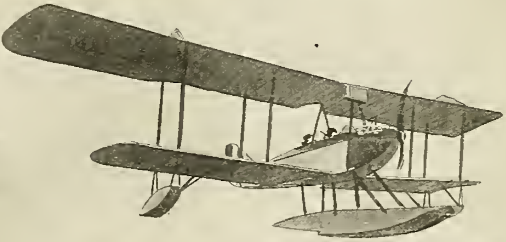
STANDARD J-H



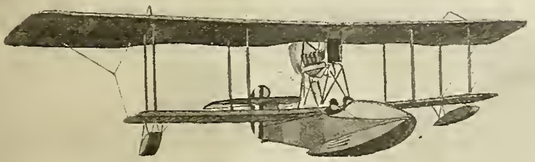
BOEING



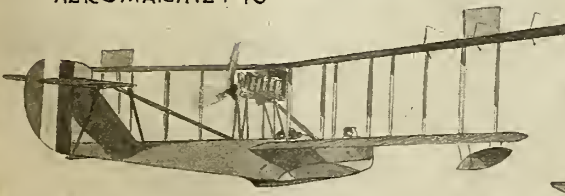
LOUGHEAD F-1



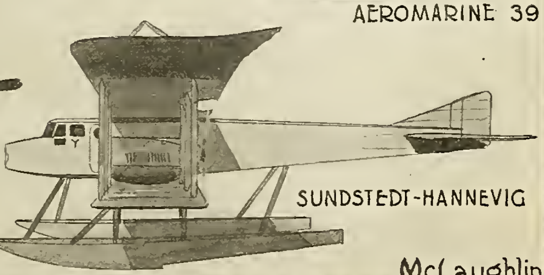
AEROMARINE 39



AEROMARINE . 40



H-S 2-L FLYING BOAT



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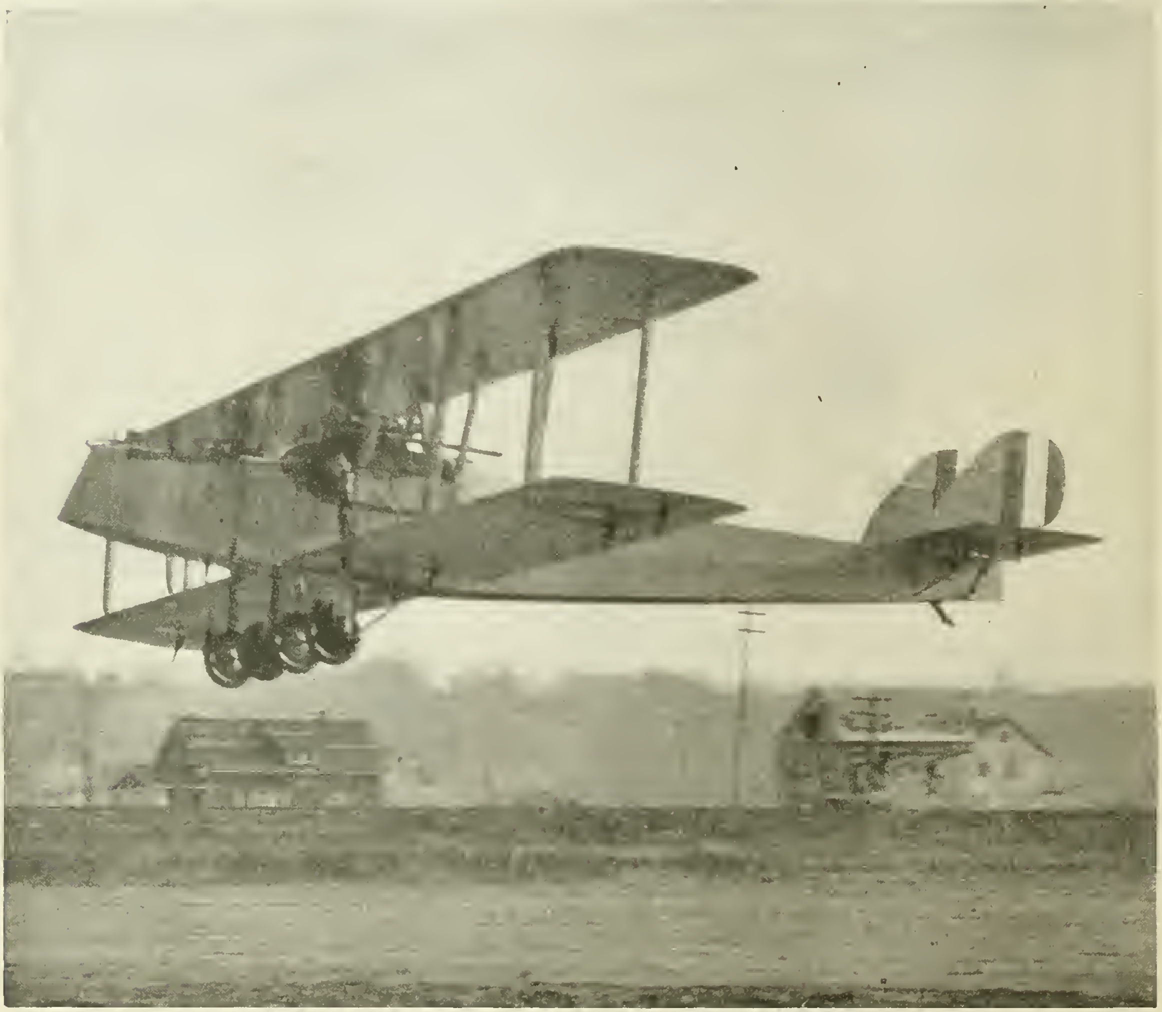
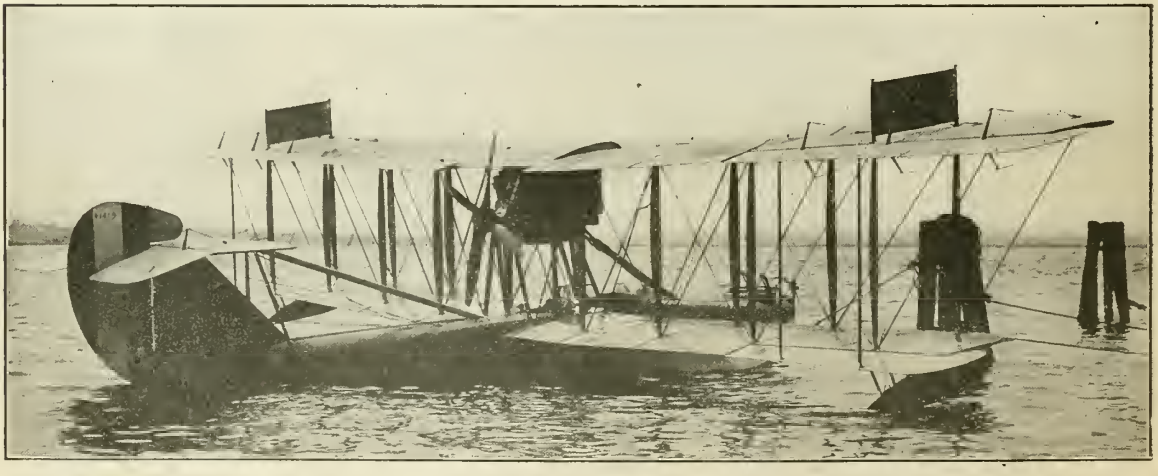
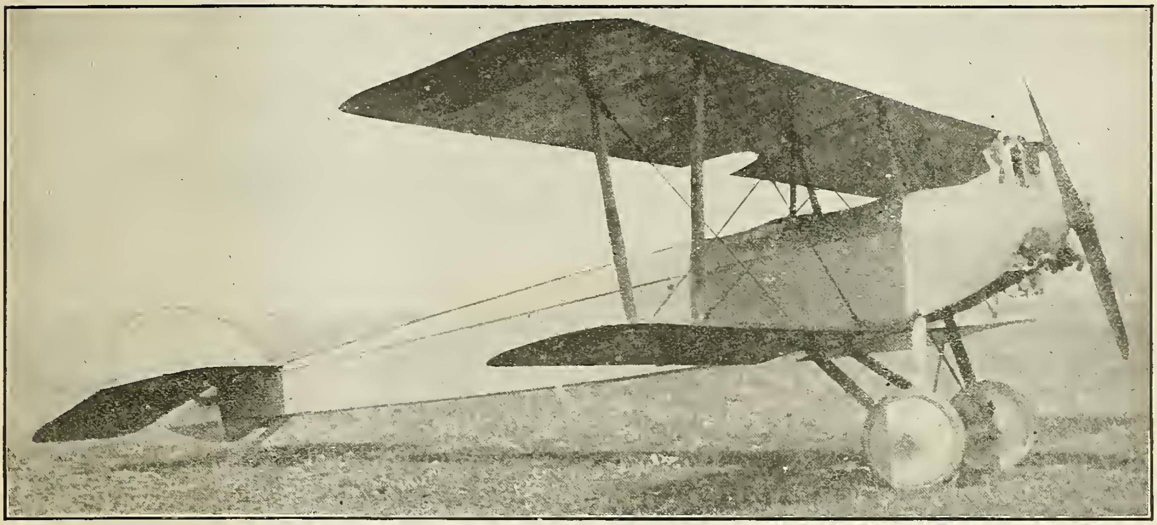


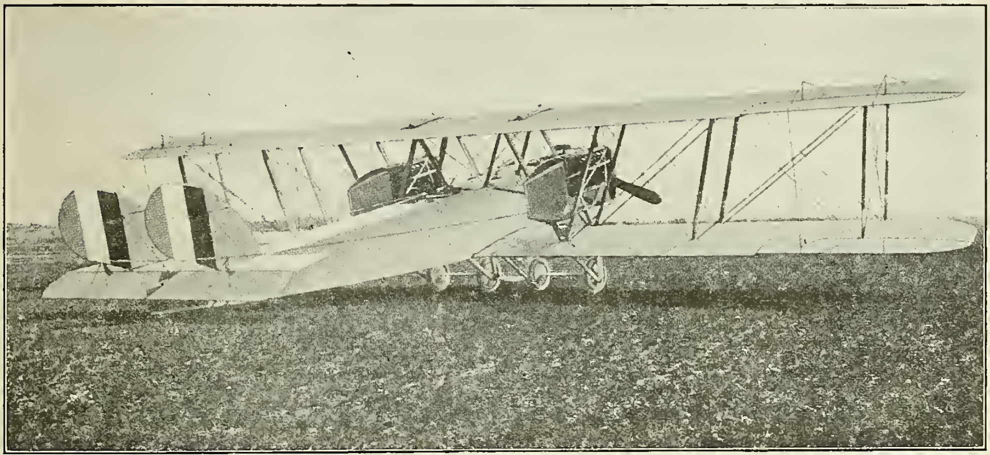
The Glenn L. Martin biplane, equipped with two Liberty motors, which has made a number of extraordinary records in the past three months



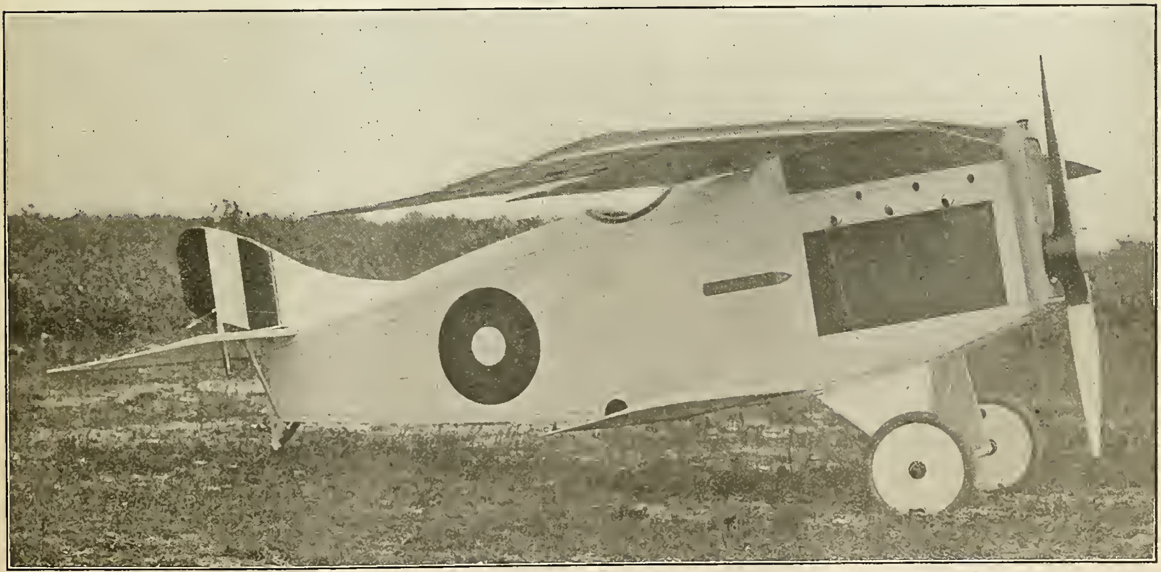
The Model H. S. 2 L. Flying Boat, constructed by the Standard Aircraft Corporation



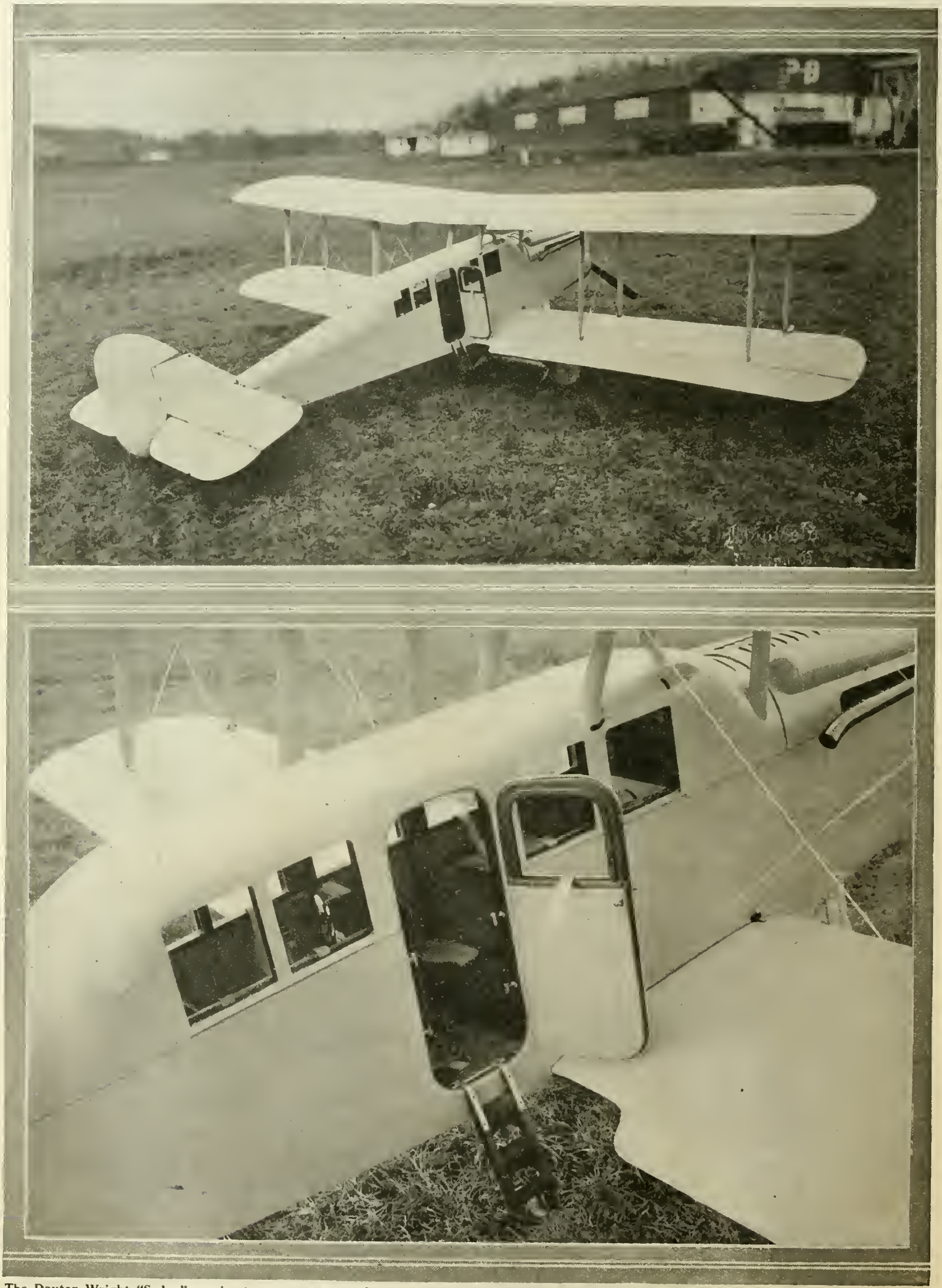
The Bellanca Biplane, showing the neat appearance of the warping wings and streamline body



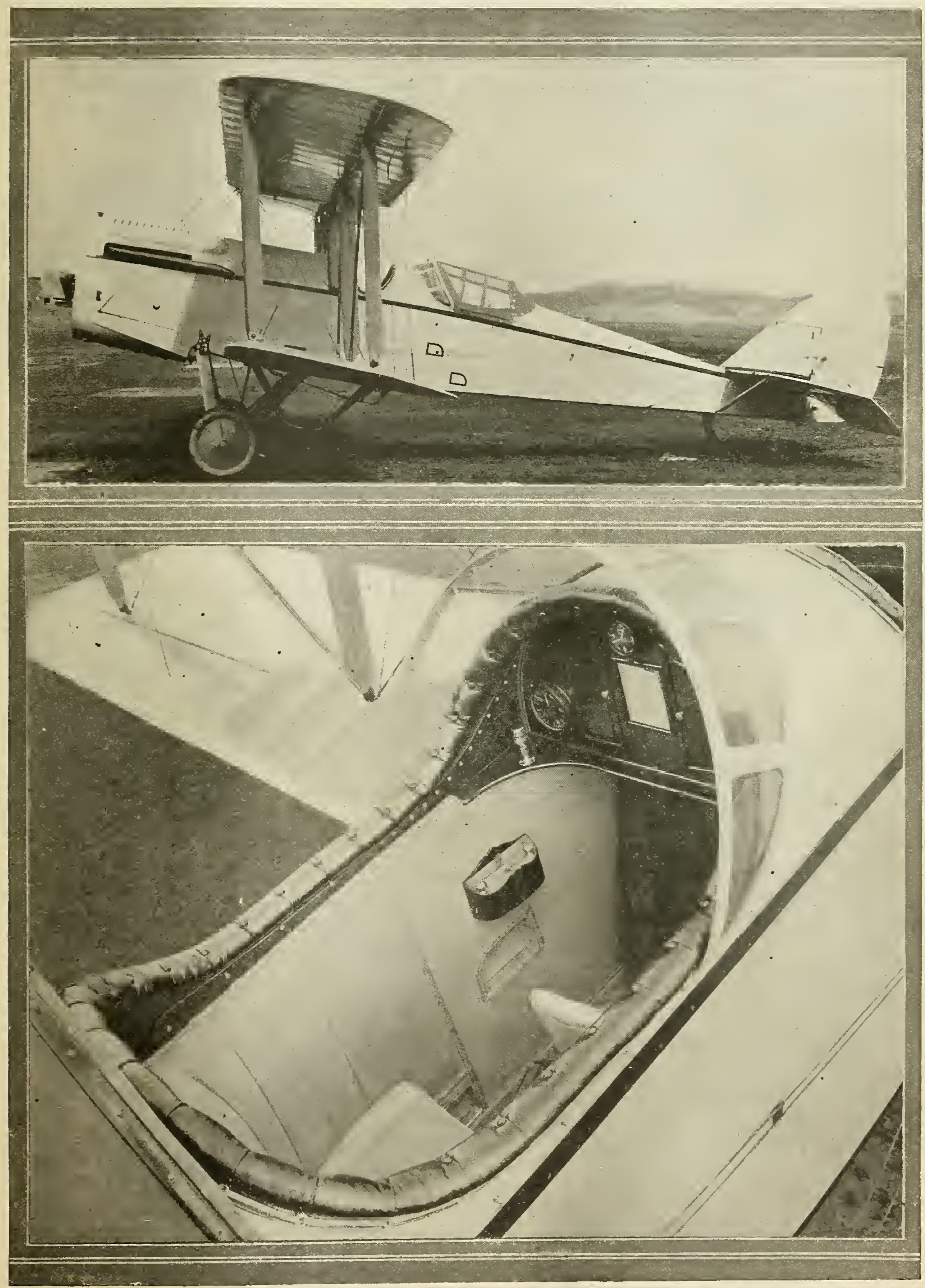
The Glenn L. Martin twin Liberty engined bomber that flew from Pittsburgh to Washington, a distance of 175 miles in one hour and fifteen minutes



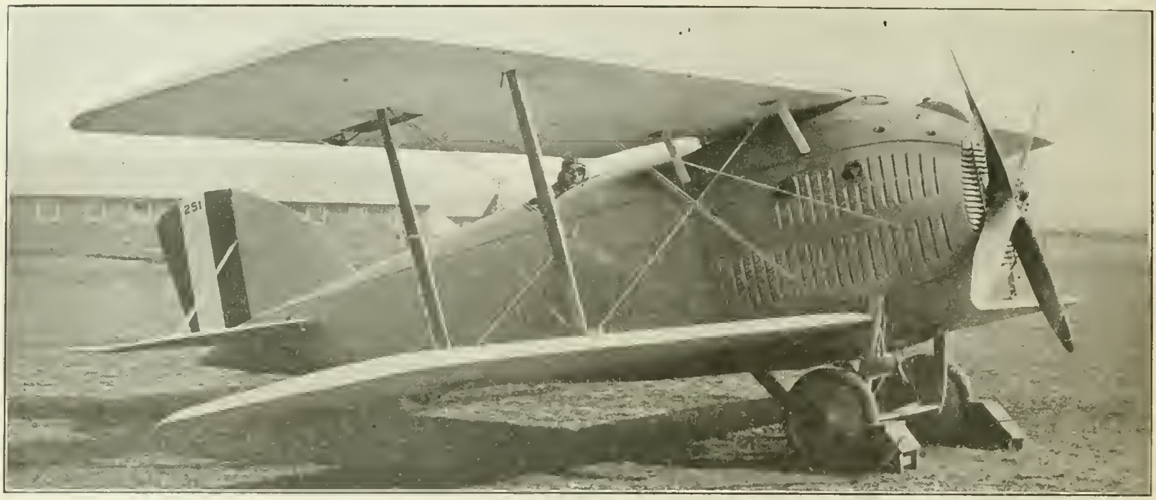
Christmas "Bullet" strutless and wireless biplane which makes a speed of 170 miles an hour with a 6 cylinder Liberty Motor



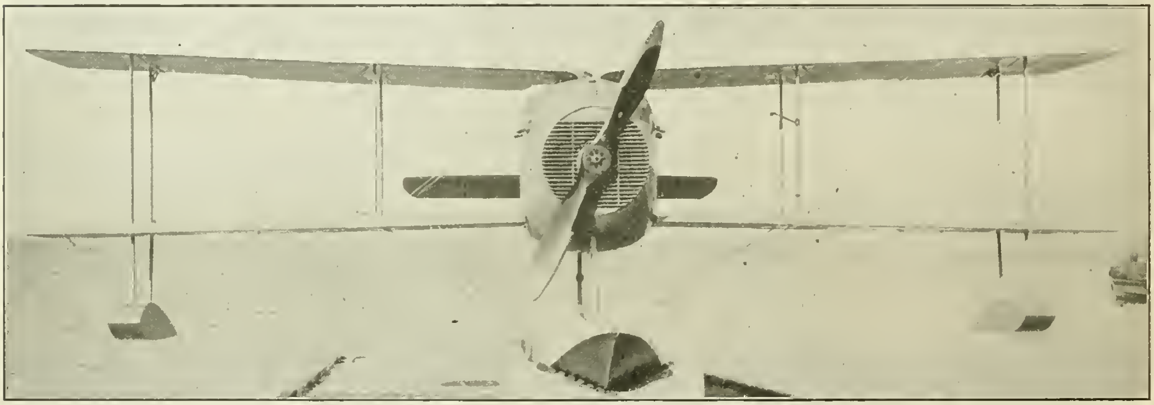
The Dayton-Wright "Sedan" carries two passengers and a pilot. It is completely enclosed and has a body with four windows on either side, has electric ceiling lights, upholstered swivel chairs, a card or dining table and rugs on the floor. It was designed under the direction of President Harold Talbott of the Dayton-Wright Company



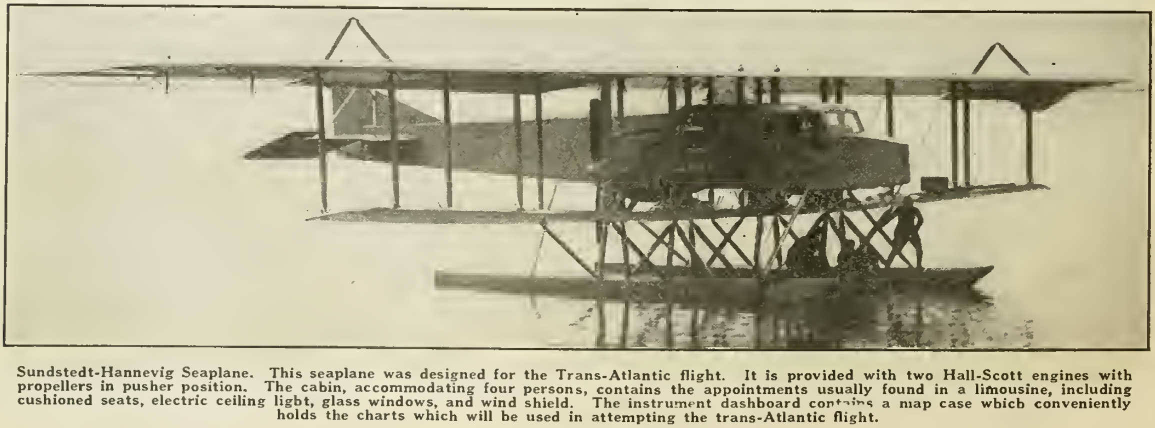
The Dayton-Wright "Honeymoon Express." It has two upholstered sea built-in mahogany vanity and lunch boxes, and bevel plate mirrors. It holds two passengers and pilot. It is painted in cream and black and is equipped with a Liberty Twelve. The machine has a maximum speed of 115 miles per hour and minimum of 53



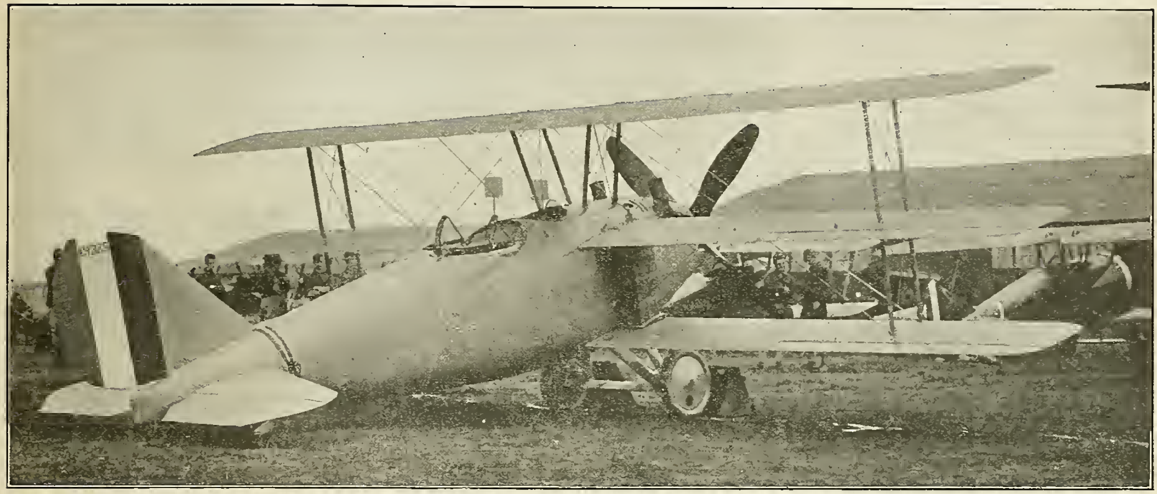
Curtiss Model H-A Mail Machine. Streamline has been carried out to a very effective degree on the Curtiss Model H-A Mail Machine. The fuselage is exceptionally deep, wings being attached directly to the fuselage and a single pair of struts used at either side. A Kirkham model K-12 engine is used, connected to a four bladed propeller with high pitch. The photograpb shows the neat way in which exterior control wires have been eliminated



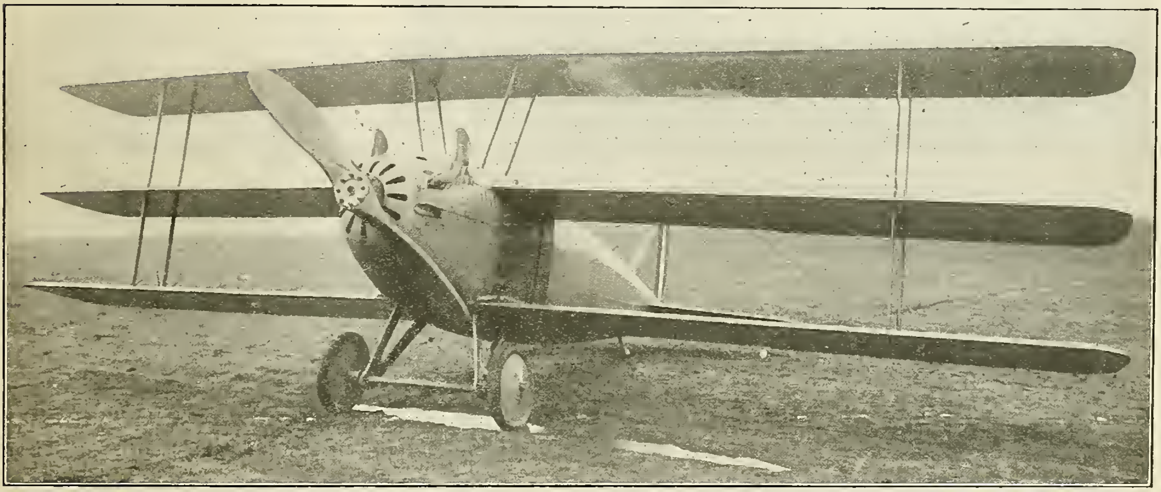
The Curtiss Model H-A Hydro. An unusual feature in this machine is tbe single pair of struts from the pontoon to the fuselage, the deep body and the elimination of struts between the wings and body. The upper plane has the customary positive dihedral but the lower planes slope downward in a negative or reversed dihedral. The Hydro resembles in many respects the H-A Land Machine but two sets of struts are used on the Hydro because of the greater span



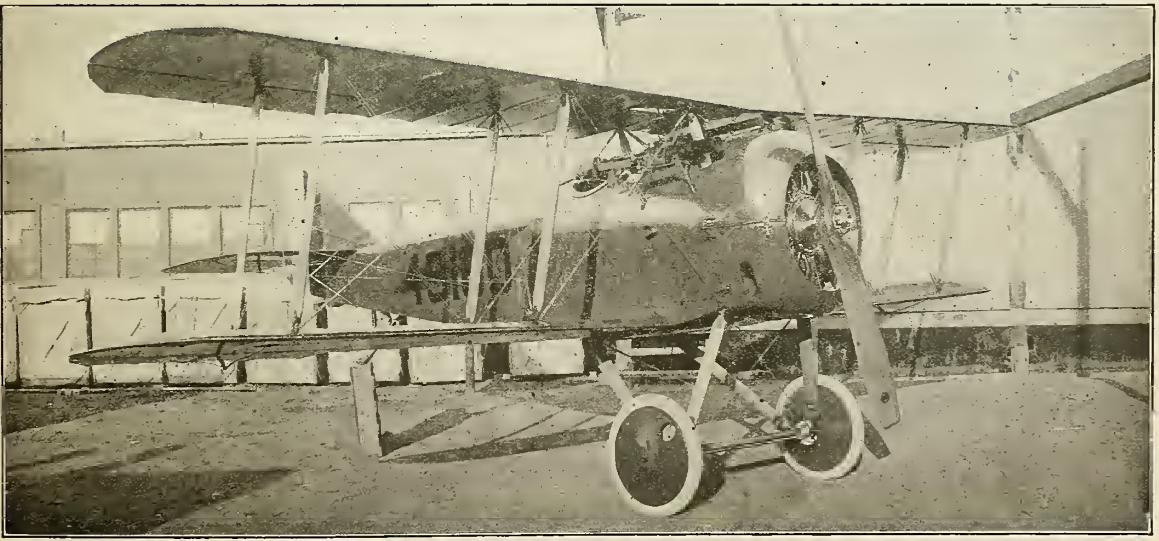
Sundstedt-Hannevig Seaplane. This seaplane was designed for the Trans-Atlantic flight. It is provided with two Hall-Scott engines with propellers in pusher position. The cabin, accommodating four persons, contains the appointments usually found in a limousine, including cushioned seats, electric ceiling ligbt, glass windows, and wind shield. The instrument dashboard contains a map case wbicb conveniently holds the charts which will be used in attempting the trans-Atlantic flight.



The Curtiss Model K triplane equipped with the Curtiss K-12 engine



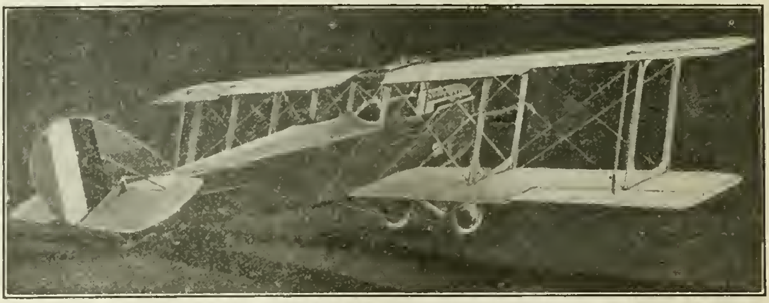
Three-quarter aero of the Curtiss Model K triplane

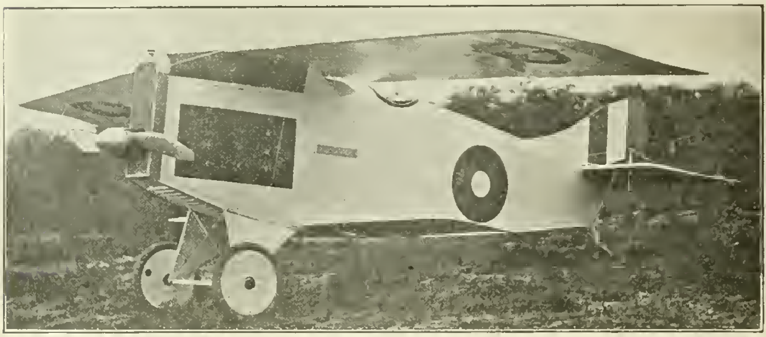


The Standard ME-1 defense Scout, equipped with 80 H.P. Le Rhone engine

LE PERE FIGHTER

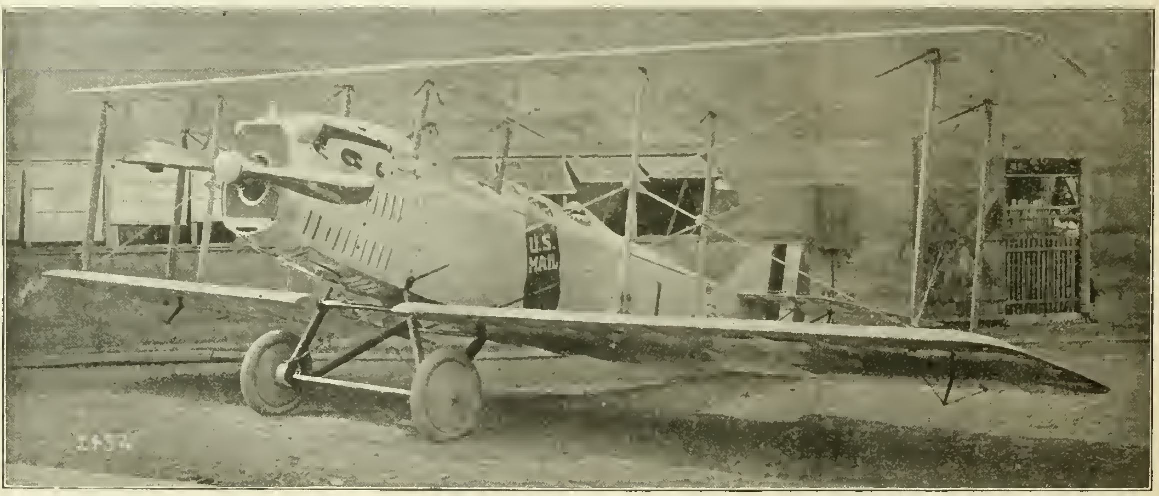
The Le Pere has a span of 39 feet, and overall length of 25 feet and a height of 10 feet. Ground speed 136 M.P.H. A "Liberty 12" 400 H.P. engine is used. The fuselage is built up of Veneer



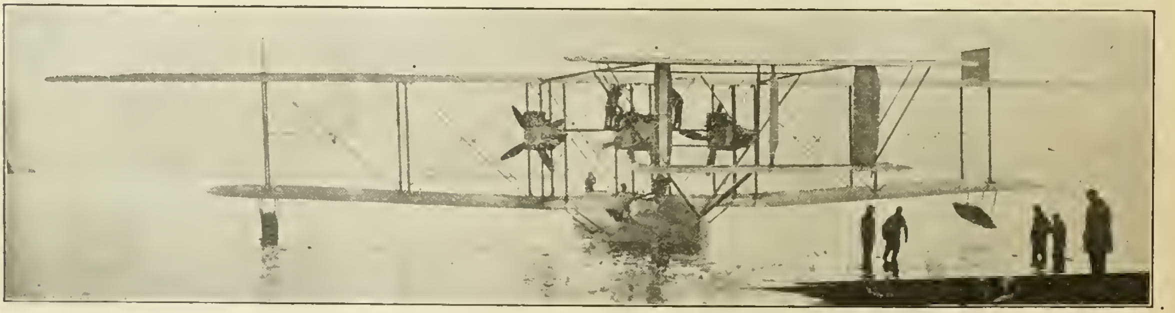


CHRISTMAS "BULLET"

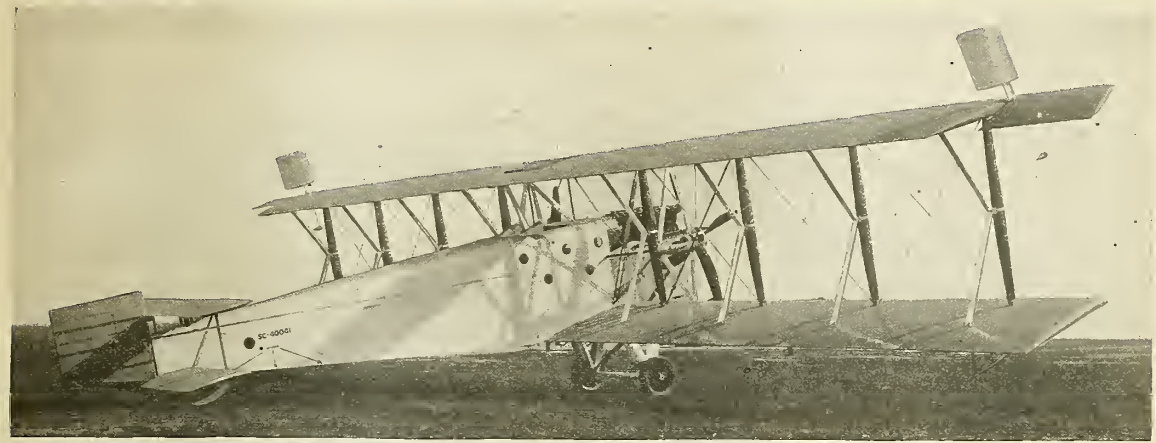
With a Liberty "6"—185 H.P. engine, the "Bullet" has attained a speed of 175 M.P.H. The upper plane has a span of 20 ft. and no bracing is used to keep them rigged. Minimum speed 50 to 60 M.P.H. Cruising radius 550 miles



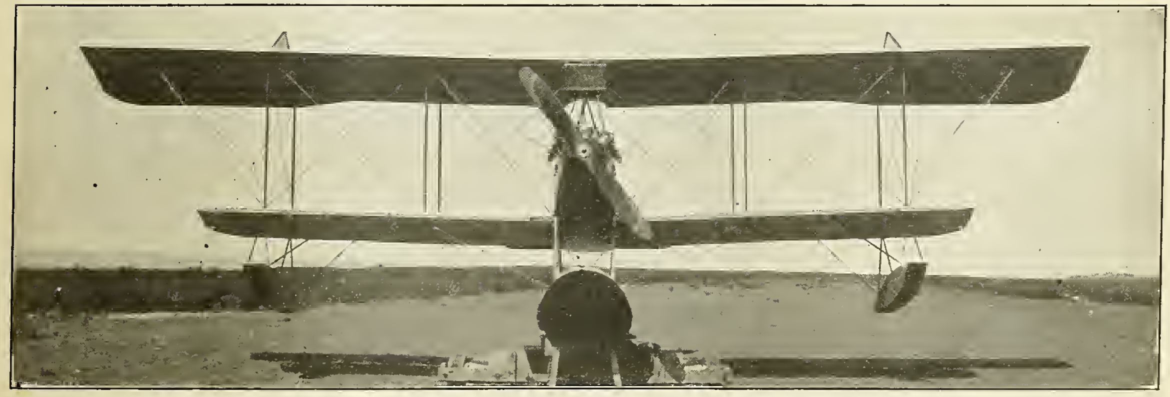
The "Standard" Type E4 Mail Plane, which has a capacity for carrying 180 pounds of mail. With an Hispano-Suiza 150 H.P. engine the machine makes a speed of 100 M.P.H.



The Curtiss NC-1 returning from a trip

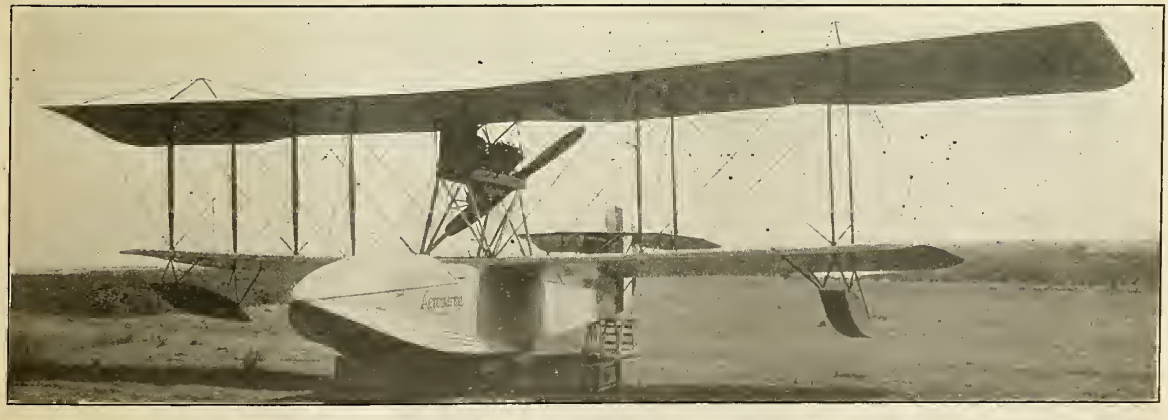


The J. V. Martin Tractor. One of the very original machines developed in this country by Captain James V. Martin for the Signal Corps. A single Liberty "12" engine drives two four-bladed tractor screws by means of bevel gears. This machine has the Martin automatic wing-end ailerons, K-bar interplane struts and other unusual mechanical constructional features



FRONT VIEW OF THE 100 H.P. AEROMARINE NAVY TRAINING SEAPLANE

The Aeromarine Navy Training Seaplane. It is equipped with a Curtiss OX 100 horse-power engine or the new Aeromarine 130 horse-power engine. This seaplane is of the single float type, a development of the Aeromarine twin float Seaplane which has been used extensively by the Navy Department. With the single float the machine is easy to manoeuver on the water



The Aeromarine Model 40 T Flying Boat is provided with a 100 horse-power Curtiss OX engine. This machine has been designed to answer requirements of the sportsman. The Aeromarine 130 horse-power Type L engine is supplied when desired. Span of Upper Plane 48 feet; Chord, 75 inches; gap, 78 inches; total weight 1,925 pounds; weight fully loaded, 2,485 pounds. The wing floats have a buoyancy of 264 pounds. 35 gallons of gasoline are carried

THE MANUFACTURE OF VENEER AND PLYWOOD

By B. C. BOULTON, B. S., A. E.

THE development, during the past year, of plywood in its application to aeroplane construction has been greater than that of any other material. Previous to 1918 plywood had been used more or less successfully in fuselage work, and in a somewhat crude way in rib construction. At that time but little definite information was available regarding its properties, design, or the method of applying it. Since then a great deal of experimentation has been carried on by several of the leading manufacturers of plywood and by the U. S. Government, both at McCook Field, Dayton, Ohio, and at the Forest Products Laboratory, Madison, Wis. As a result of their work the efficiency of this material, especially in fuselage and rib construction, has increased more than 100 per cent. and several new applications for it have been developed. The processes used in the manufacture of veneer and plywood are therefore of unusual interest to the aircraft designer and builder.

In the veneer industry there are two distinct manufacturing operations—the cutting of the log into thin sheets, known as veneer, and the building up of this veneer into plywood. The larger plants, as a rule, carry on both these operations simultaneously, but at the present time there are many factories devoted wholly to the cutting of veneer, while others specialize in the manufacture of plywood. Woods which are most used for veneer are birch, poplar, basswood, spruce, Spanish cedar, maple, mahogany, walnut, gum, ash and oak. For aeroplane work different species are often used in combination in plywood, depending on the properties that are desired.

As the logs are unloaded at the veneer mill they are separated according to their variety. Although it may often be impossible to cut up the logs immediately, an important principle in regard to their storage is that the sooner a log is made into veneer after being taken from the living tree the better will be the results. Season checks and cracks have less opportunity to develop. Decay, particularly in the heartwood and along the season checks, is largely prevented, and therefore much waste in sawing off the ends of the logs is eliminated. But especially for ease in cutting the veneer in the slicer and rotary cutter is it desirable to have the logs fresh and full of sap. This condition is most important in the case of gums, maples, birches, and woods with sweet sap.

Methods of Cutting

The three general processes by which veneer is produced from the log are rotary cutting, slicing and sawing. Of these methods the most important is rotary cutting in which the log is placed in a large lathe and the veneer cut tangentially in a continuous sheet. About 70 per cent. of all veneer, including all the cheaper grades, is cut in this manner. The finer woods like walnut, maple and mahogany are usually quarter cut, that the full beauty of their grain may be obtained. In this case slicing or sawing must be resorted to. However, some logs of gum and poplar give bastard (tangential) cuts of very striking figure. Where quarter-cut veneer thinner than 1/32 inch is desired it must be cut by a slicer. Small logs of the more expensive woods, that would be quarter cut if possible, must be rotary cut in order to get widths which are of any value.

The preparation of the logs varies with the process used. For slicing and rotary cutting steaming is required, while for veneer sawing and slicing it is necessary to saw the log longitudinally into a number of wedge-shaped pieces.

Rotary Cutting

With all woods which contain frost, or which are dry, steaming is necessary, as it is with the harder woods, but unless the thickness of the veneer exceeds about 3/16 inch most soft species that are fairly fresh may be rotary cut without preliminary steaming. (A description of steaming bins and the routine followed in the process will be given later in connection with slicer cutting.) As the logs come from the steam bins they are barked, and any irregularities on the surface, such as projecting swellings or overgrown limb stumps are trimmed off. They are then cut to the desired length in a large cross-cut saw and the ends squared. The center of each end is carefully located and then the log is picked up by a derrick, swung into position, and centered in the rotary cutter, as shown in Fig. 1.

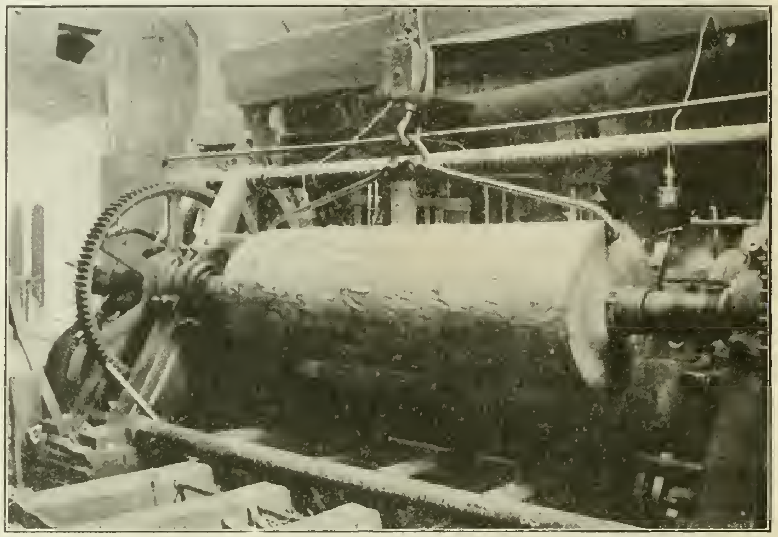


Fig. 1—Centering of log in rotary cutter

A cutter of this type is in effect a huge wood-turning lathe, with a long stationary knife fixed in position behind the log, its cutting edge at the same elevation as the axis of the chuck and spindle. Fig. 2 shows clearly the relative arrangement of the parts. The spindle into which the chuck fits is threaded for part of its length, so that when turned by a certain train of gears it advances and drives the spurs into the ends of the log, which must be very firmly gripped. Slightly forward of and above the main blade will be noticed several small adjustable knives in planes at right angles to the long knife. These are for the purpose of cutting the sheet of veneer into whatever lengths are required. The points of these knives meet the log just before it reaches the horizontal knife and cut shallow, narrow grooves around its circumference. The size of chuck used depends partly on the diameter of the log and partly on the amount of decay in the heartwood. The spurs must obtain a hold in sound wood. Since the smallest chuck is 6 inches in diameter, at least 6½ inches of log must necessarily be wasted. But, owing to the unsoundness that is usual in heartwood, this is but a slight disadvantage. In fact, it might be mentioned in passing that one of the important advantages of rotary cutting over slicing or sawing is the small influence that center decay has on the value of a log. For in the latter processes the log must be sawn into sectors, and serious decay at the center very materially reduces the width of the sheet that can be obtained.

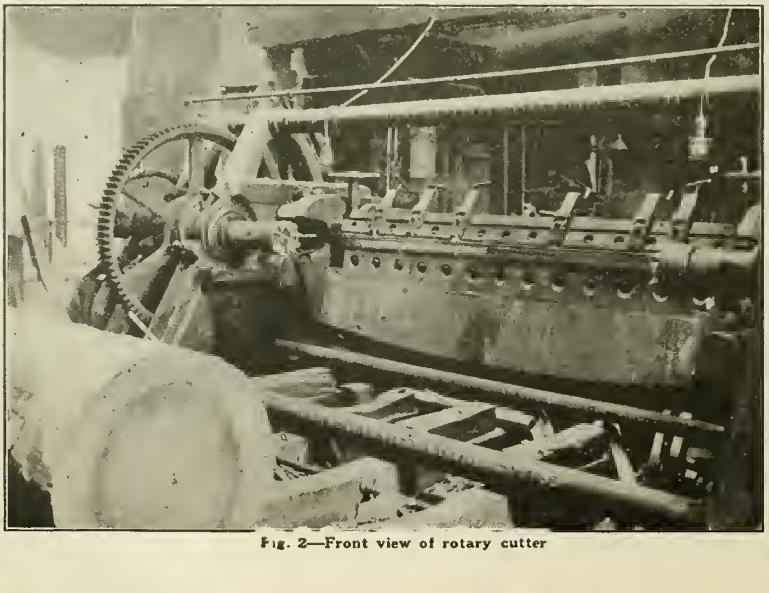


Fig. 2—Front view of rotary cutter

The sheet of veneer comes out at the back of the machine through a slot just below the edge of the long cutting knife, as shown in Fig. 3. The rate at which the veneer is cut varies as the diameter of the log because the rotary speed of the cutter, though slightly lessened when the load is excessive, is approximately constant at about 28 r. p. m., giving to the log a peripheral velocity depending on its size.

Veneer Sizes.—The maximum length to which veneer may be cut is limited by the size of the knife. The greatest length in use at the present time is 16 feet; however, the majority of knives are less than 8 feet 6 inches. With a long log the pressure of the knife acting on a large unsupported length tends to cause the log to chatter near its center. For this reason greater wastage occurs, owing to the impossibility of cutting the log to a small diameter. The sheet of veneer may be cut to any desired width if care is used to avoid breaking it in handling. Widths of 20 to 30 feet should be obtained without difficulty unless the veneer is very thin. In the preceding description the term "length" refers to the dimension parallel to the direction of the grain, and the term "width" to that perpendicular to this direction. With soft woods, thoroughly steamed, veneers up to ⅜ inch thick may be obtained, though a better maximum is 5/16 inch. In the case of oak, mahogany or maple not more than a ¼-inch thickness can be expected. On the other hands, these harder woods, with a tough fibre and fine grain, can be cut to a minimum thickness of 1/64 inch, while for poplar and gum 1/32 inch is a minimum value.

Minimum thicknesses are limited chiefly by breakage in handling, and during the past year special methods have been devised that partly remedy this difficulty.

The crew of a rotary cutter consists of five men, including one operator and two chippers. The latter catch the veneer as it falls from the knife, carry it back from the machine until the required width is reached, and then cut it off. It is necessary to obtain a given dry width, to allow for a certain shrinkage from the wet width. This increase for gum is 1½ inches per foot, for poplar 1¼ inches, and for oak 1 inch. The other two men of the crew are needed for the work of steaming and preparing the logs.

Preparation of Logs for Sawing and Slicing

Steaming.—If logs are to be cut into veneer on a slicer they must first be steamed. This operation is carried on in large bins which, if below ground, are generally of concrete, if above ground of wood with walls 6 or 7 inches thick. The rough logs are lowered by a derrick into these bins on which heavy wooden covers are then placed and tightly clamped down. Steam is now turned on. Most woods, except oak and mahogany, require steaming only over night, but with the latter 18 hours is usually needed. The size of the logs and the amount of frost they contain are factors in determining the duration of the steaming and the pressure necessary. For poplar, gum and walnut low pressure steam is sufficient, while the denser, harder woods must have steam under somewhat greater pressure. If the operator desires to accelerate the process he may do so by employing higher pressures. Some latitude is permissible in both the time and the pressure and the operator may exercise his judgment. In all cases the frost must be taken out, and after that a few woods, like walnut, unless fairly dry, need only warming through.

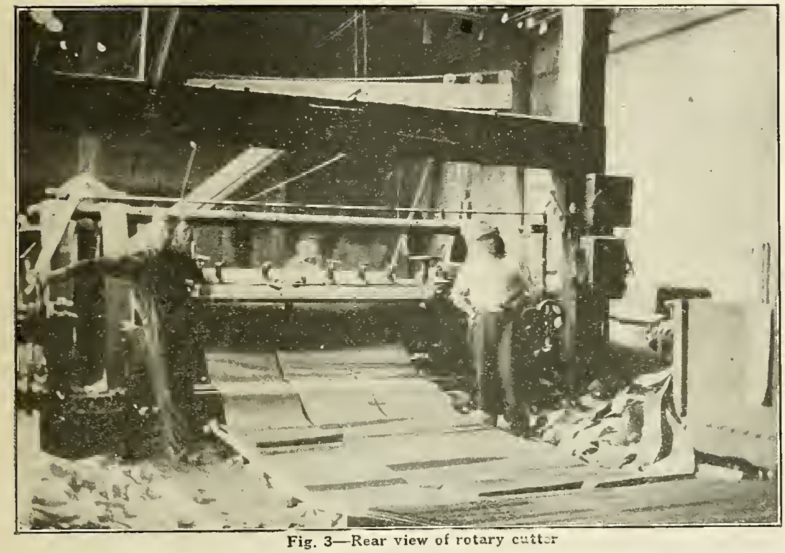


Fig. 3—Rear view of rotary cutter

Sawing the Logs.—The logs are first barked and trimmed, and then placed on the carriage of a large band-saw, so that the saw will pass directly through the center of the log at each end. The carriage is seen in the foreground of Fig. 4 in its relation to the edging saw at the extreme left, and the veneer saws in the background. The sawyer next determines into how many "cants" or "pies," C, (Fig. 5) it is best to cut each half the log, his decision being based on the size and location of any defects that may be present on the diameter of the log, and on the width of the veneer desired. The cants are held by dogs on the carriage and trimmed to the flitch "F" by cutting off the corners "D," the heart, if defective, and one or two boards "E." Frequently it is necessary to saw the entire cant into boards if it appears unsuitable for veneer. The boards "E" are taken at once to the edging saw and trimmed. The waste parts are generally removed and used for fuel. The flitch "F" is now ready for either the veneer saws or the slicers.

For all quartered work the log is so placed that the cuts are radial. Occasionally, however, as with walnut, gum or poplar, in which there is no special quartered figure, flitches are prepared for bastard sawing or slicing.

A band saw crew consists of four men, the expert sawyer and three helpers, one of whom runs the edging saw for trimming up the boards.

Slicer Cutting

This process is not in such extensive use as either rotary cutting or veneer sawing, yet it has certain advantages within its own field. The chief of these, perhaps, is that the entire flitch can be utilized, whereas in veneer sawing, in spite of the thin saw employed, from 30 to 60 per cent. is wasted in saw kerfs. This becomes an important item when the wood is an expensive mahogany, curly maple or walnut. Again, if quartered veneer less than 1/30 inch thick is desired it must be cut on a slicer, for that is a minimum thickness for veneer sawing.

In slicer cutting the wood is sawn into flitches, as described above, for either quarter or bastard slices. Soft woods like poplar, especially when full of sap, do not require steaming, unless the veneer is more than 1/16 inch thick. Other woods, in a similar condition, need not be steamed if less than 1/32 inch thick, but all wood when full of frost or when dry must be steamed, particularly oak and mahogany.

Reference to Fig. 6 will help to make clear the construction of a slicer. It consists of two principal parts—the stay log, a heavy casting with a broad vertical face with grooves in which are mounted adjustable dogs that grip the flitch, and opposite this a heavy ribbed casting holding the knife. The stay log, with the flitch, is given a reciprocating motion that is forward and downward in its positive direction while the knife is stationary and slightly inclined upward, with the cutting edge of the blade up. The knife is narrow, ordinarily not more than 14 feet long, and rapidly increases in thickness from the cutting edge to give a strong and rigid backing to the latter. Through a "pressure bar" running parallel to the knife, and regulated by a hand wheel, the thickness of the veneer is controlled. This wheel is graduated along the rim, and turns past an index. One complete turn increases or decreases the thickness ½ inch, and fractional turns change the thickness proportionally. It is impossible to cut the entire flitch into veneer, as about ¾ inch is required by the dogs that grip the flitch. If the latter is heavy or of very hard wood this unused width often increases to 1 or 1⅛ inch.

Veneer Sizes.—The maximum length of flitch that can be handled is determined by the length of knife in use, which is usually 12 to 14 feet, rarely as much as 18 feet. The softer woods may be cut to a thickness as great as ¼ inch when thoroughly steamed. The ordinary minimum thickness for any work is 1/96 inch, which, by careful adjusting, alignment and sharpening of the knife, may be decreased to 1/120 inch. Of course, only hard, fine-grained woods can be used for very thin veneer, with the exception of Spanish cedar. The maximum width is two feet. However, when great widths are wanted the maximum length is decreased somewhat.

Three men compose a slicer crew, the operator at the wheel regulating the pressure bar, and two helpers who place the strips of veneer on a table as they fall from the knife.

Veneer Sawing

This process, possibly because of its simplicity, is more widely used than slicing for the production of quartered veneer. As is illustrated in Fig. 7, the flitch is firmly held by numerous dogs or clamps which slide up and down in grooves in a heavy stay log. This stay log, like the usual carriage of a saw, travels back and forth, carrying the flitch against the saw. This is circular with its cutting edge made up of several segments of thin steel securely bolted to the heavier steel casting which stiffens and supports the cutting segments. A kerf 1/16 inch wide is made by such a saw and, as in a slicer, at least ¾ of an inch of the flitch is required for the dogs to grip.

The sheets of veneer as they are sawn off are piled in order, and when the flitch is finished the top sheet is marked with the number of the log for purposes of later identification, a procedure which is also followed with veneer cut in a slicer.

Veneer Sizes.—The maximum length it is possible to cut is dependent on the extreme travel of the stay log. With some saws this is 24 feet, but 14 to 16 feet is the more usual limit of travel. A minimum thickness is 1/32 inch, though in ordinary practice 1/28 inch is better. A maximum width is about 18 to 20 inches. Since for quartered work the diameter of the log must be at least twice the width of the veneer, and if the heart is unsound as much as three times the width, it can be seen that for veneer sawing large and consequently expensive logs are used.

Three saws, with a total crew of five men—one expert, two sawyers and two helpers—constitute an efficient working unit. Since two men are required to operate a saw most effectively, and since it frequently happens that one of the saws has to be stopped for repairs or sharpening, this arrangement makes it possible to keep two saws busy continuously, with the expert occasionally running a third. A band-saw crew of four men is able to turn out enough flitches to keep such a unit supplied.

Drying Veneer

After the veneer has been cut by one of the

(*Continued on page* 1272)

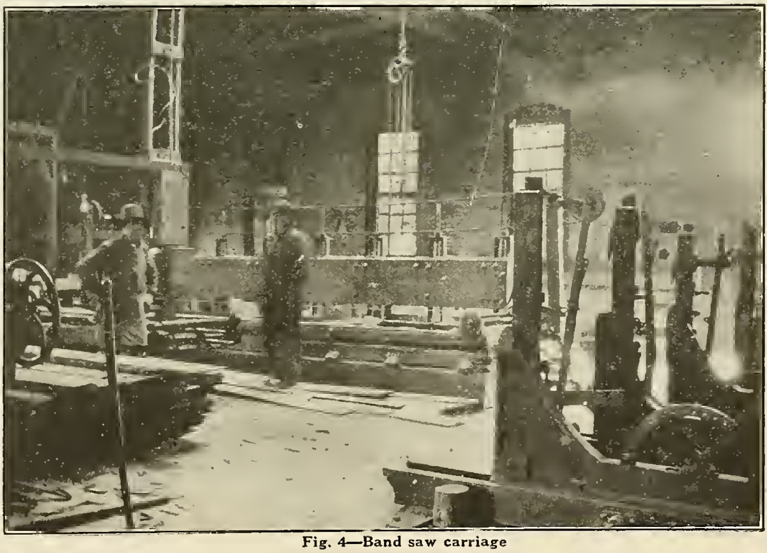


Fig. 4—Band saw carriage

AMERICAN AERO ENGINES

By G. DOUGLAS WARDROP, M.S.A.E., A.S.M.E.

THE LIBERTY TWELVE

THE Liberty "Twelve" was comprehensively described for the first time in AERIAL AGE for December 16 and 23, with complete illustrations. It was the one purely American aeronautic contribution that got into large production, and was hailed by our Allies as an eminently useful power plant.

General Data:

Number and arrangement of cylinders	Twelve-Vee
Included angle	45°
Bore	5″
Stroke	7″
Stroke-bore ratio	1.4:1
Area of one piston	19.635 sq. in.
Total piston area	234.62 sq. in.
Swept volume of one cylinder	137.445 cu. in.
Displacement of motor	1649.5 cu. in.
Compression ratio (Army)	5.4:1
Compression ratio (Navy)	5:1
Normal brake H. P.	400 at 1750 RPM
Type of valve gear	Overhead cam shaft and valve rockers
Number of carburetors	Two Duplex Zenith

Lubrication:

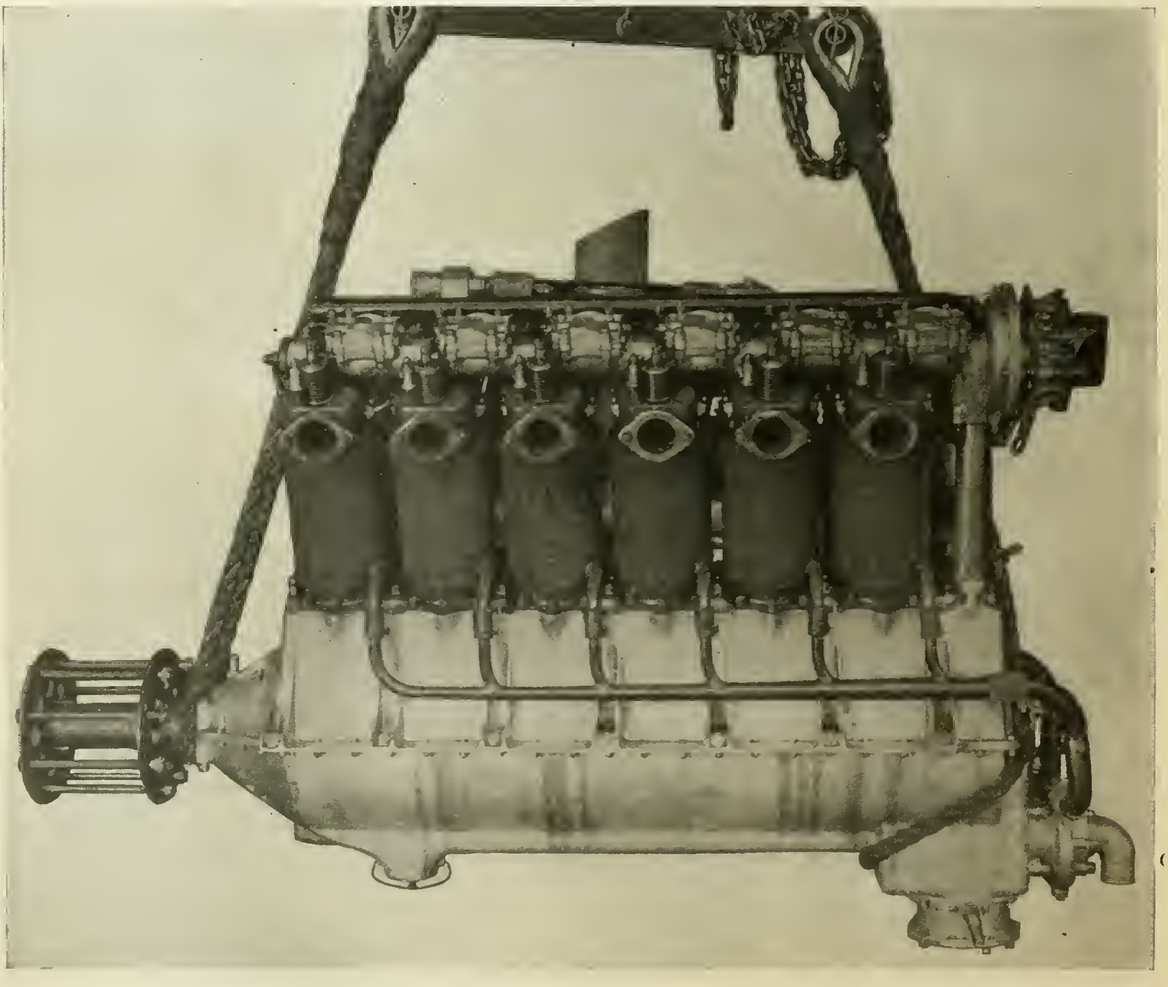
Type	Forced feed
Type of pumps	Rotary gear
No. of Pumps	1 double pressure and 1 scavenging
Ratio of pump speed to crankshaft speed	1.5:1

Ignition:

Type	Battery and generator
Firing order	L 1-9-5-11-3-7, R 8-4-12-6-10-2
Number of plugs per cylinder	2
Type of plug	A. C.
Ratio of generator speed to crankshaft speed	1.5:1

Cooling System:

Type	Water cooled
Pump	1 centrifugal
Diameter of inlet pipe	2″
Diameter of outlet pipe	1⅜″
Number of outlets	2
Diameter of rotor	3⅛″
Ratio of pump speed to crankshaft speed	1.5:1
Water temperature inlet	155° F.
Water temperature outlet	175° F.



The Liberty Motor

THE KING-BUGATTI

IN our issues of February 10 and 17 we presented to the engineers of the automotive industries the first complete discussion of the re-design and manufacture of the Bugatti engine in America, which was destined to be of very great value if the war had continued until the present spring. It was the first power plant designed to permit of the mounting of a 37 millimeter gun, which fired its shells through the hub of the propeller.

In re-designing the motor Charles B. King, to whom the work was entrusted, made very many improvements, and on the various tests made at the plant of the Duesenberg Motors Corporation, at Elizabeth, where it was manufactured, it showed marked efficiency.

General Data

Number and arrangement of cylinders	16 vertical, 2 rows of 8 in blocks of 4
Material	Cast iron
Bore	4.33″ 110m.m.
Stroke	6.3″ 160m.m.
Stroke-bore ratio	1.435:1
Area of one piston	14.725 sq. in.
Total piston area	235.6 cu. in.
Swept volume of one cylinder	92.768 cu. in.
Displacement of motor	1484.288 cu. in.
Compression ratio	5:1
Normal brake H. P.	410 at 2,000 R.P.M.
Type of valve gear	Overhead camshaft and valve rockers
Number of carburetors	Four Miller special
Ratio propeller to crankshaft speed	666:1

Ignition

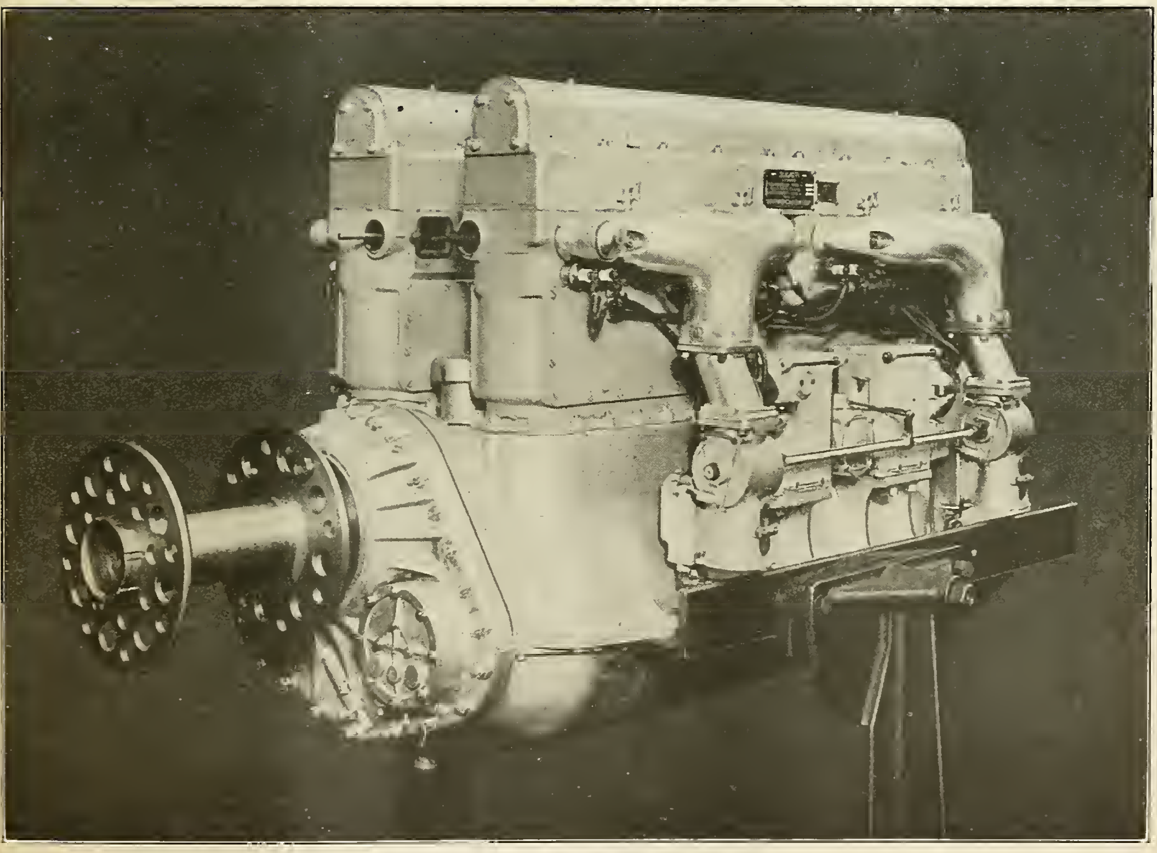
Type	Magneto
Number	4
Make	"Dixie 800"
Firing order:	1L, 7R, 5L, 4R, 3L, [illegible] 2R, 4L, 6R, 8L, 1R, 2L, 5R, 6L, 3R
Number of plugs per cylinder	2
Type of plug	Titan A. C.
Advance	38°
Magneto rotation	Clockwise

Cooling Systems

Type	Water cooled
Pump	1 centrifugal
Inside diameter of inlet and outlet elbow to cylinders	1½″
Number of inlets	2
Number of outlets	2
Water temperature inlet	150° F.
Water temperature outlet	160° F.

Lubrication

Type	Forced feed and spray
Type of pump	Rotary Gear
Number of pumps	One pressure, one scavenging
Oil pressure	30 lbs.



The sixteen cylinder King-Bugatti aviation engine

THE CURTISS K-6 and K-12

IN the design of Curtiss K-6 and K-12 motors, the form of construction adopted gives a minimum centre distance between cylinders, together with careful placing of the accessories, makes the motor compact and easily placed in the fuselage, at the same time the accessibility of the various parts is such that sub-unit may be readily inspected or overhauled without disturbing the motor in the aeroplane.

Gear Reduction

The gear reduction of the Model K-12 raises the centre of thrust to a point near the centre of gravity, and close to the centre of projected area. This enables the design of the nacelle or fuselage to be reduced in size, with consequent lower head resistance.

Ignition

Double ignition, from the two separate magnetos, gives a more instantaneous explosion, which at high engine speed is necessary to develop high mean effective pressures. The spark plugs are located near the intake valves, on the upper side, to guard against fouling and insure absolute ignition. The wire assemblies are enclosed in insulating covers of micarta, which guard against short circuit and injury.

Carburetion

A duplex carburetor (K-12 is provided with two carburetors), each tube supplying one set of three cylinders, assures a more satisfactory charge than a single carburetor equipment, due to the separate manifolds which prevent starving and eddying, and the better vaporizing properties of two small carburetors over one large one. In addition, hot water jackets are provided on the manifolds to assist in vaporizing the gasoline.

Lubrication

Pressure feed through crankshaft, propeller shaft and camshafts, insures a continual film of clean oil on all bearings. Separate return pump with double intake absolutely prevents accumulation of oil in either end of pan, and consequent flooding of cylinders when machine is climbing or gliding. Pressure adjustment permits of individual adequacy of oil feed on each motor, and change for wear and varying conditions of service.

Type of Motor

K-6 is a six-cylinder water cooled—cylinders en bloc— aluminum construction. K-12 is a 12-cylinder motor with a 5:3 gear reduction to propeller shaft.

Horse Power

K-6 rated at 150 H.P. at 1,700 R.P.M. K-12 rated at 375 H.P. at 2,250 R.P.M. at crankshaft.

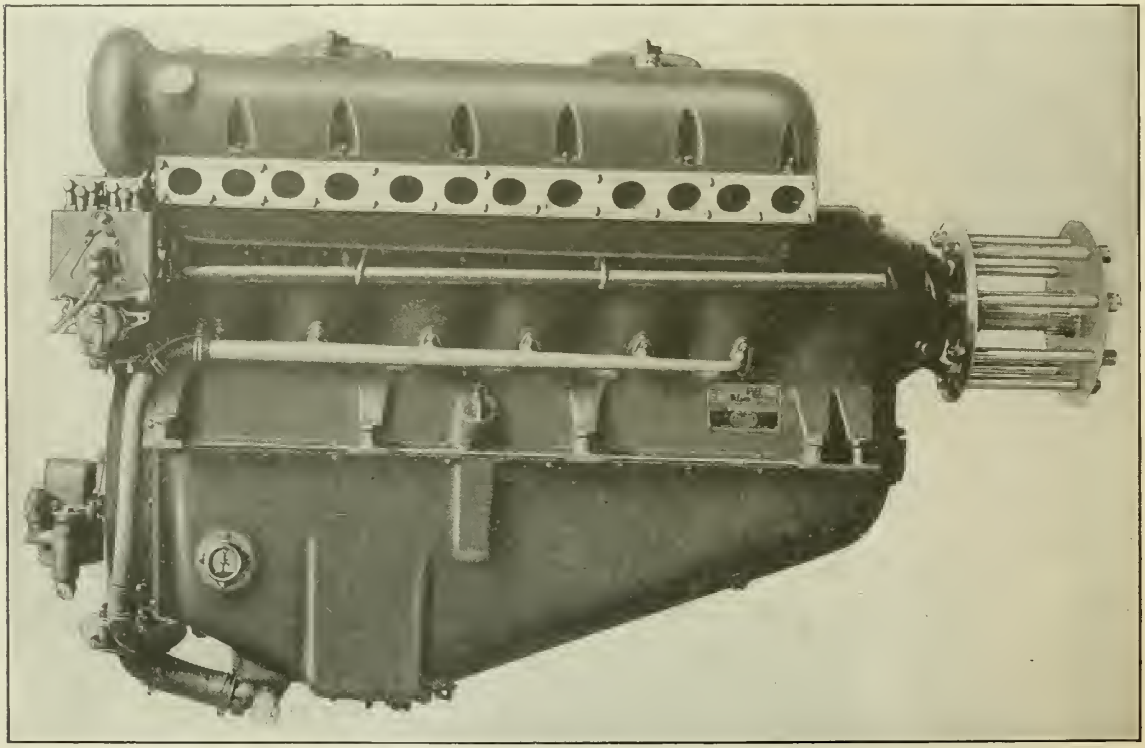
Bore and Stroke

4½" x 6".

Weights (Lbs.)	*Model K-6*	*Model K-12*
Cooling Water in Motor	—	38
Basic Motor	346	589
Carburetor and Intake Manifold	18	37
Ignition Equipment	32	37
Water Inlet Lines	4	4
Exhaust Manifold	14	28
Hand Starting Crank	3	—

Gasoline Consumption

Fifty-five lbs. per H.P. Hour.



The Curtiss Model K-12 aviation motor

THE HISPANO-SUIZA

THE Hispano-Suiza engine has been used in far larger quantities by the allied arms than any other motor and has been produced in much greater numbers than any other design of aeronautical engine.

It has been built in France, Spain, England and America, and is about to be made in Japan. Originated in Switzerland and Spain through the old Hispano-Suiza Motor Car Co. by Marc Birkight, the engineer and general manager of the company, it was quickly taken up by the French Government, being an engine which at that time was exceptionally light for its power and was also very easy to manufacture by comparison with the rotary motors and with the majority of the water-cooled fixed cylinder engines of French or British origin. For France it did so well in the air that a large number of French factories were ordered to drop their own experiments and devote all their energies to Hispano-Suiza manufacture. At the signing of the armistice there were seventeen plants in France wholly given over to Hispano work.

Meanwhile one of England's largest automobile plants had been taken over by the British Government to make a slightly modified copy of the French motor and the Wright-Martin Aircraft Co. of New Brunswick, N. J., had started to make an exact copy of the French engine, for France, before the U. S. entered the war.

The latest products of the Wright-Martin Company were completely described and illustrated in Aerial Age for December 30, 1918, and January 6, 1919.

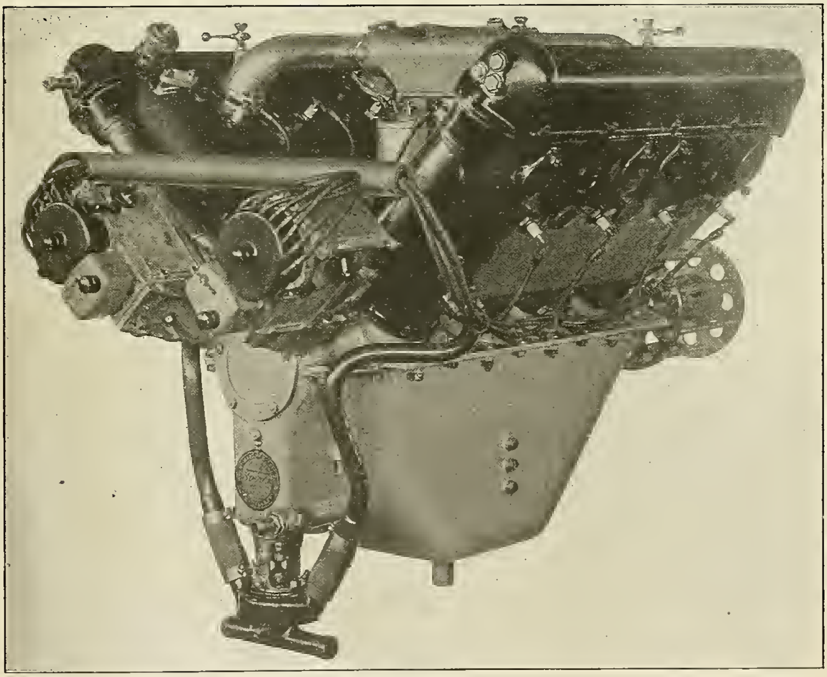
During the period from June, 1917, till the end of that year, Birkight went on with experimental work on the 300 h.p. and H. M. Crane, Vice-President of the Wright-Martin Aircraft Co., also proceeded with a design which, while it embodied most of the French features, yet differed in some very important points. When placed on test last Spring at the Bureau of Standards at Washington, and later at McCook Field, Ind., this Crane motor showed substantially more power than the French engine with the same bore and stroke and had a much lower oil consumption. It was also easier to manufacture in several details, and was stronger than the French engine, making for greater durability. The weight was slightly greater, but the power to weight ratio was slightly better in the American design.

In course of developing the 300 h.p. sundry small discoveries were made which led to alterations in the smaller motors then in production at New Brunswick, so that at present the 150 h.p. and the 180 h.p. American Hispano engines are quite distinct from the French motors of the same rated power and cylinder dimensions. The differences are, however, matters of detail and are not such as to prevent interchange of American and French engines in the same plane.

In all there are four types of Wright-Martin Hispana motors. Model A is the original and is a copy of the French 150 h.p. precisely. Model I is the improved 150 h.p. which for some time past has been supplied for American training planes.

Next comes the 180 h.p., which is known as Model E and is identical with Model I, except that the pistons are different, giving the higher compression. Finally there is the 300 h.p. or Model H.

All four engines are eight-cylinder V type with 90 degrees between the blocks, and each of the three smaller ones have the same piston displacement, their bore being 120 mm. or 4.72" and stroke 130 mm. or 5.11". Models A and I develop 150 h.p. at 1,450 r.p.m. Model E develops 185 h.p. at 1,750 r.p.m.



The Wright-Martin Hispano-Suiza

THE DUESENBERG MODEL H

The Model H Duesenberg motor, developing 850-900 horse power, built by the Duesenberg Motor Corporation, of Elizabeth, N. J., is the most ambitious aero engine development that has been attempted, and carried through successfully, in the United States. It was fully described in Aerial Age for January 27, 1919. It was designed by F. S. Duesenberg, the pioneer builder of automobile speed engines, and he had the able assistance and coöperation of William Beckman. The motor is of the sixteen-cylinder V type, with the cylinders at an angle of 45°, and the weight of the power plant with gear drive is 1,575 lbs., without gear drive, 1,390 lbs.; remarkably low weight ratio for a power plant of its power.

General Data

Number and arrangement of cylinders	Sixteen V
Included angle	45°
Bore	6"
Stroke	7½"
Normal Brake Horsepower	800 at 1,800 r.p.m.
Type of gear	Overhead camshaft and valve rockers
Number of carburetors	Four Miller

Lubrication

Type	Forced Feed
Type of pumps	Rotary Gear
No. of pumps	1 double pressure and 1 scavenging
Ratio of pump speed to crankshaft speed	1 to 1

Ignition

Type	Battery and generator
Firing order	L: 4-8-8-2-6-1-5-3-7; R: 1-5-3-7-4-8-2-6
Type of plug	A. C.
Ratio of generator speed to crankshaft speed	2 to 1

Cooling System

Type	Water cooled
Pump	1 centrifugal
Diameter of inlet pipe	1⅝"
Diameter of outlet pipe	1⅝"
Number of outlets	2
Diameter of rotor	5¾"
Ratio of pump speed to crankshaft speed	1 to 1
Water temperature inlet	125 F.
Water temperature outlet	155 F.

Valves

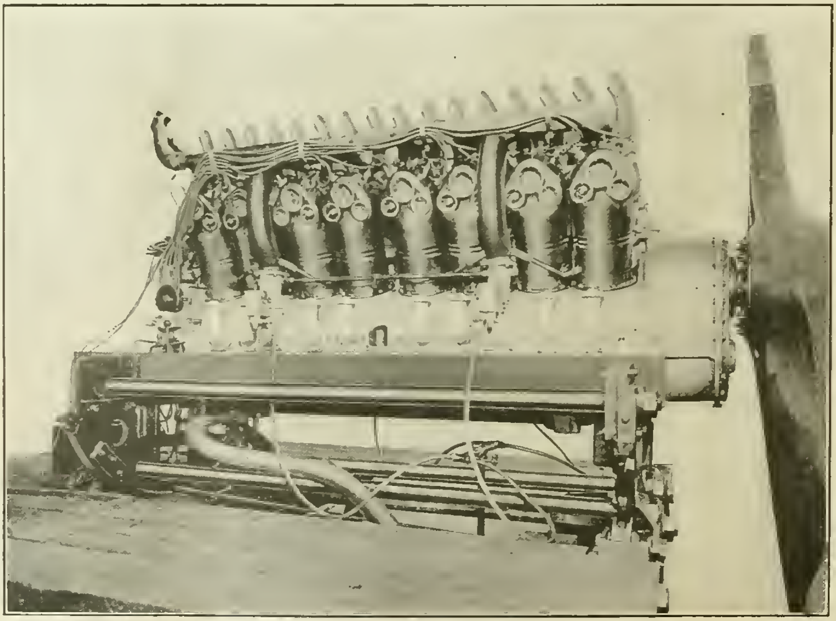
Number per cylinder	One inlet and two exhaust
Outside diameter	Exhaust 2-3/16", Inlet 2-5/16"
Port diameter	Exhaust 1-31/32", Inlet 2-23/32"
Width of seat	7/64"
Angle of seat	30°
Valve lift (inlet)	9/16"
Valve lift (exhaust)	½"
Diameter of stem	Inlet ½", Exhaust 7/16"
Length of valve	Exhaust 6-27/32", Inlet 6⅞"
Number of springs per valve	Two concentric
Length of springs in position	Outer 2⅞", Inner 2¾–
Mean diameter of coils (large spring)	1⅛"
Mean diameter of coils (small spring)	1"
Inlet rocker clearance	.010
Exhaust rocker clearance	.015

Cylinders

Overall height of cylinders	19-1/16"
Length of projection in crankcase	2¾"
Diameter of cylinder over water jacket	6-27/32" min.
Diameter of cylinder over water jacket	7-7/32" max.

The ignition mountings permit of any standard make magnetos being used and recent motors have been equipped with two 8-cylinder Dixie magnetos of fixed spark and Delco special distributor with battery current furnished by Delco and Liberty generator. The Pilgrim battery ignition system has been tested on this engine also with very successful results.

In the cooling system the water is delivered from the pump through two 1⅞" diameter tubes which connect to two headers or manifolds, one along each side and one located directly under the valves near the top of the cylinders. This header is joined to the cylinder by means of the outlet connections. At each cylinder where the water enters is welded a distributor which leads two streams of water, one directly beneath each exhaust port and a third stream to the outside of the cylinder wall or barrel.



The Duesenberg Model H 850-900 H.P. motor

THE LAWRANCE 60 H.P. AIR COOLED ENGINE

THE Lawrance Model L-1 is a three-cylinder Y-type air-cooled engine rated at 60 h.p. at 1,900 r.p.m. The accompanying graph shows that the engine delivers 30 h.p. at 800 r.p.m. and 63 h.p. at 2,100 r.p.m.

Bore, 4.25 inches; stroke, 5.25 inches. Cylinder displacement, 225 cubic inches. The weight complete with propeller hub, 130 pounds. This weight includes everything necessary for running, with the exception of the oil tank and mounting plates for which an additional weight of nine pounds is allowed. Starting handle is supplied when desired. Exhaust pipes made to individual requirements.

Cylinders

The cylinders are of cast aluminum with cooling fins machined. Shelby steel liners with walls 1/16 inch thick are cylinder and the crankcase. Liners are case-hardened and ground, which gives them a very fine wearing surface.

Each cylinder is attached to the crankcase by means of six studs.

Pistons

Pistons are of cast aluminium alloy. Crowns are flat. Each piston has four concentric cast iron rings and one wiper ring on skirt.

Crankcase

Crankshaft is of chrome nickel-steel. It has a single throw and is counterbalanced. The shaft is hollow for lubrication.

Front end of shaft is tapered to receive the propeller hub which is drawn tight by means of a differential thread nut. The shaft is sturdy and of large dimensions throughout.

Connecting Rods

Connecting rods are of chrome nickel-steel. They are round, of constant section and hollowed for lightness. They are machined all over. Each of the three rods has a segmental shoe which floats in two grooves in the big end bearing.

Bearings are of cast bronze with Babbitt lining.

Wrist pins of nickel-steel float in both the rods and pistons. Bronze buttons on the ends of wrist pins keep them from working out sidewise.

Valve Gear

Valve gear consists of three individual camshafts, each with two cams. The push rods are adjustable.

Rocker arms are provided with rollers where they come in contact with the valves so that all side thrust on the valve guides is eliminated.

Valves are of Tungsten steel, 2 1/16 inches in diameter.

Exhause valves are mercury treated so as to more readily conduct the heat from the head of valve to the stem.

Guides and valve seats are also of cast bronze, set into heads of the aluminium cylinders.

Springs are of a new type. They are conical in shape, wound of flat steel placed edgewise and tapered so that the greater width is in the large coils and lesser width in smaller coils. This permits of a shorter spring than would be possible with the usual helical coil spring.

Ignition

Two kinds of ignition are supplied. One type is a magneto designed by Mr. Kilsrath of the Simms Magneto Company which has a single breaker and one primary winding but two high tension windings, giving two absolutely synchronized sparks.

Magneto is run at 1½ times engine speed. The high tension distributor is separate and driven off one of the crankshafts.

The other ignition system is the "Philbrin," designed by the Philips-Brints Ignition Company. This system has a dual spark with two breakers; either one is used to fire the entire system; allowing perfect synchronization.

One of the accompanying illustrations shows the magneto in place.

Carburetor

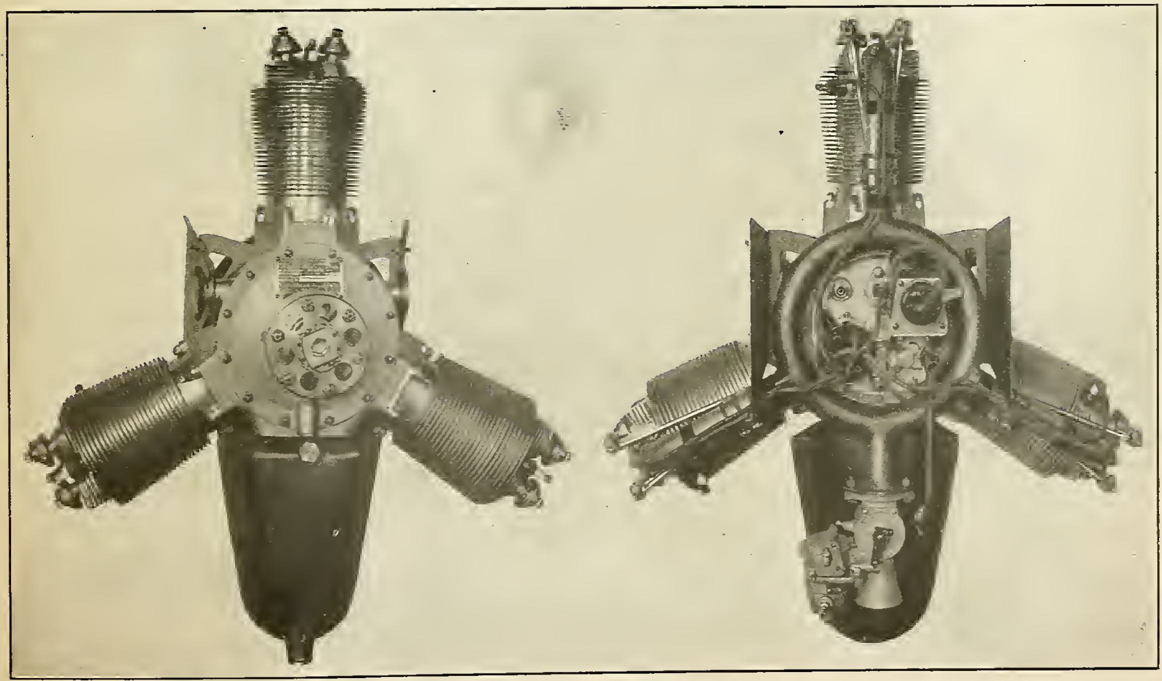
A Miller Carburetor is used. It has a throat 1¾ inches in diameter.

Lubrication

Lubrication is by means of pressure supplied by a gear pump. Pressure is maintained at 25 pounds per square inch.

The oil is fed through the rear of crankshaft to the front cover where it runs to a check valve which maintains the necessary pressure. From this valve the oil drains back to the tank immediately below it. On the front cover plate, the by-pass valve operates at a pressure of 50 pounds. It might seem that the two lower cylinders would obtain most of the oil but as a matter of fact it has been proven that the oil is evenly distributed to the 3 cylinders.

Oil is consumed at the rate of .07 lbs. per h.p. per hour.



The Lawrance 60 H.P. air cooled aero engine

THE UNION 6-CYLINDER AEROMOTOR

THE six-cylinder Union Aeromotor, manufactured by the Union Gas Engine Co., of Oakland, California, has many interesting features. It was first fully described in AERIAL AGE for July 9, 1917, and since that time has been wonderfully developed and improved.

General Description

Type—Six (6) cylinder, vertical, four-cycle, water-cooled, valve in head.

Power—120 h.p. at 1,350 r.p.m.

Weight—Engine with two carburetors, two magnetos, pumps and water piping, weighs 485 lbs.

Cylinders—Cylinders are of steel, with semi-steel head for valves and spark plugs. Base flange integral with walls of cylinder. In test, these cylinders when held by base flange only, withstood a hydraulic test of over 1,200 lbs. per square inch, or a total pressure on the head and base flange of over ten tons.

Cylinder water-jackets are of copper, with brazed joints. Upward thrust of cylinders is taken by chrome nickel studs extending from main journal caps to cylinder flanges.

Valves—Valves are of E. W. P. alloy. Stem guide is long, and water-cooled for its entire length. Valve springs are double, concentric, and of the helical type, right and left-hand.

Rocker Arms — Rocker arms are machined from solid chrome-nickel steel forgings, and heat-treated. Bearings are ¾" diameter and 2½" long. Shape of arms is such that oil leakage is prevented without the use of packing. Excessive wear of valve stem end, caused by point contact of adjusting screw, is eliminated by having line contact in place of points; length of contact between rocker end and valve stem being ⅜". Valve clearance is obtained by use of small cap with thin discs on end of stem. Cap is held by cotter so that adjustment is positive.

Camshaft Housing—Camshaft housing is split horizontally along the center line of the camshaft, permitting easy removal of shaft. To prevent flooding of camshaft housing when climbing, a drain from each end of housing leads down to main crankcase sump.

Camshaft Gears—All valve gears are of Midvale chrome nickel steel, heat-treated and operate in oil bath.

Magneto and Pump Gears—See camshaft gears.

Pistons—Pistons are of Lynnite aluminum alloy. Piston length is 6". Piston pin bearing is 1¼" x 2¾".

Connecting Rods—Connecting rods are I-beam section, of Midvale chrome nickel steel, heat-treated.

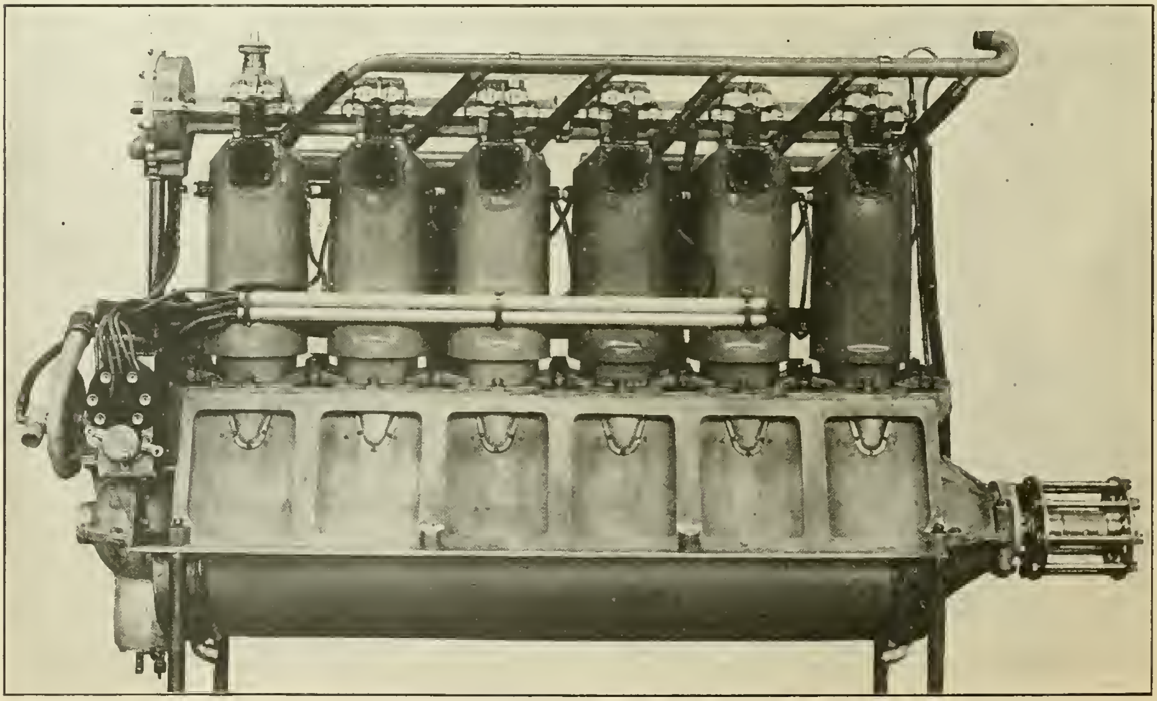
Crankshaft—Crankshaft journals are 2½" diameter by 2½" long; crank pins are 2½" diameter by 3" long. In addition to the seven main bearings, there is a bearing just outside of the thrust. Shaft is made of Midvale chrome nickel steel, heat-treated.

Thrust Bearing—Propeller thrust is taken by a two-way, self-aligning SFK bearing.

Crankcase—Crankcase is of aluminum alloy, and in addition to thorough cross-webbing, the side walls are of hollow box section. The stiffness of this construction is so great that the entire propeller torque can be taken through the length of the case without any signs of twisting or vibration, the case during this test being held from rotating at the end opposite to the propeller end only.

Lubrication—Oil is taken from the crankcase by a gear pump, delivered to a combined oil tank and cooler (located where convenient), from which it flows back to a second gear pump which sends it under a pressure of 40 to 90 lbs. to the crankshaft journals, through the shaft to the lower rod bearings and up into the piston pin. The holes in the piston for the piston pin being sealed, the oil must pass between the outer surface of the pin and its bearing. From here it is carried to the cylinder walls. The camshaft, camshaft bearings, cams, rocker arms and valve gears are lubricated by oil by-passed from the oil pressure regulator. This insured force-feed lubrication to all moving parts, even with no oil in the crankcase.

Ignition—Current is furnished by two entirely independent magnetos of either Berling or Dixie make. Each cylinder is fitted with two plugs, each plug being in close contact with a water-cooled wall for its entire circumference.



The Union 6-cylinder Aeromotor

THE KNOX TWELVE

WHEN the Knox 300 H.-P. aero engine had its first block test in November, 1916, it was then the largest power plant that had been constructed in America. Development of the motor was retarded during the war owing to the other war contracts which the Springfield Motors Company had.

The original model was a 12-cylinder, 4¾ inches bore by 7 inches stroke and is a "V" engine with six cylinders on each side, set at 60 degrees from each other.

The crankcase is a special aluminum alloy casting in one piece and extending 7 inches below from the center line of the crankshaft to give barrel section for strength.

Instead of using legs for motor supports on the crankcase, as is the general practice, this engine is supported by a shelf running the full length of the case on each side of which the motor will rest. Five (5) bolts pass through each shelf into the frame work of the aeroplane and a supporting rib or brace is cast each side of each bolt. The motor is very narrow at this point and will enter a frame 15 inches in width inside with bolt centers 17 inches.

The lower half of the crankcase is an aluminum casting in one piece and is bolted to the upper half. No mechanism is contained in this lower half and there are no pipe connections to make. A glass gauge is attached to the side of the case, showing the oil level at all times.

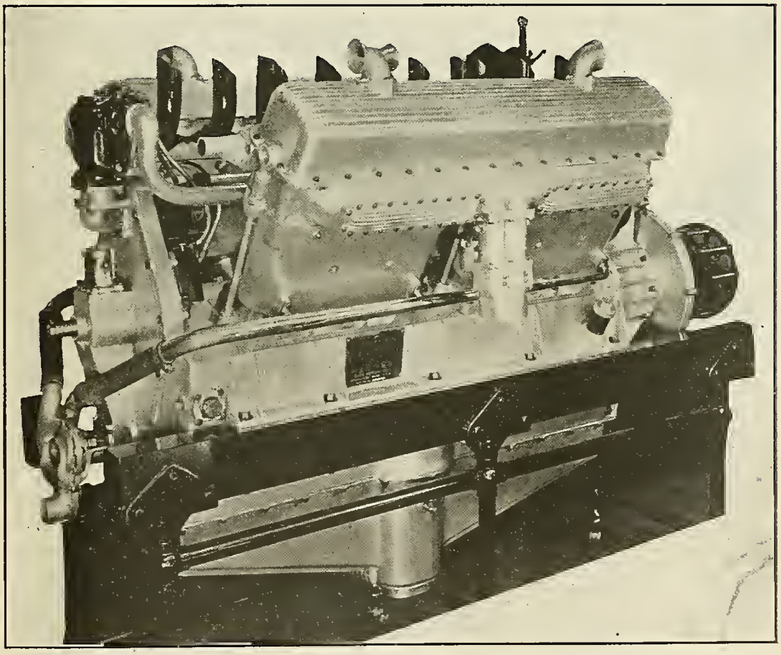
The cylinders are special aluminum alloy castings with cast iron liners ⅛ inch thick. These liners have a flange on the lower end and are pressed in from the bottom. The cylinders are cast in blocks of three and are held to the case by eight studs each. The cylinders are open at both ends and the upper portion of the bore forms the combustion chamber, which is machined all over. The corner bosses are supported by two heavy ribs each and the central bosses run clear through between the cylinders to give strong anchorage. The water jacket extends well down below the bottom of the stroke and ½ inch water space is provided between the cylinders. The piston displacement of the motor is 1,488.53 cubic inches.

The cylinder heads are cast in blocks of six, of special aluminum alloy and cast iron valve seats are cast integral with the head. The head for each six cylinders is held down by 16 nickel steel studs passing clear through the head. There are four valves to each cylinder carried in the cylinder head and the water jacketing is so arranged that each valve seat is practically surrounded by water.

Camshafts and rocker arms are carried in the head, the camshafts having eight bearings and the rocker arms being supported above it, as is well illustrated in the photographs.

The camshafts as well as the rocker arms and all mechanism in the head is under forced feed lubrication and drainage is provided back to the crankcase at the center when the motor is in normal position and at each end when the motor is tipped up or down.

Each cylinder head has an aluminum cover which completely conceals and protects all of its mechanism.



The Knox Twelve

THE HALL-SCOTT A-8

THE A-8 is a twelve-cylinder engine of advanced design, incorporating many attractive features, and developing a brake horse-power approaching 450, with an engine weight of less than 800 pounds.

Anticipating the requirements of aeronautical warfare, Lieutenant Colonel E. J. Hall, consulting engineer of the Hall-Scott Motor Car Company, and at that time active head of its experimental and production departments, began work on this twelve-cylinder A-8 model and had completed it after exhaustive tests prior to May 1, 1917. It was placed on the testing stand for its final run when Colonel Hall was called to Washington early in May, last year, to assist the Government Aircraft Production Board in the designing of an American aeroplane motor that would meet the requirements of greater power, lighter weight, and more dependability than any of those on the market at that time.

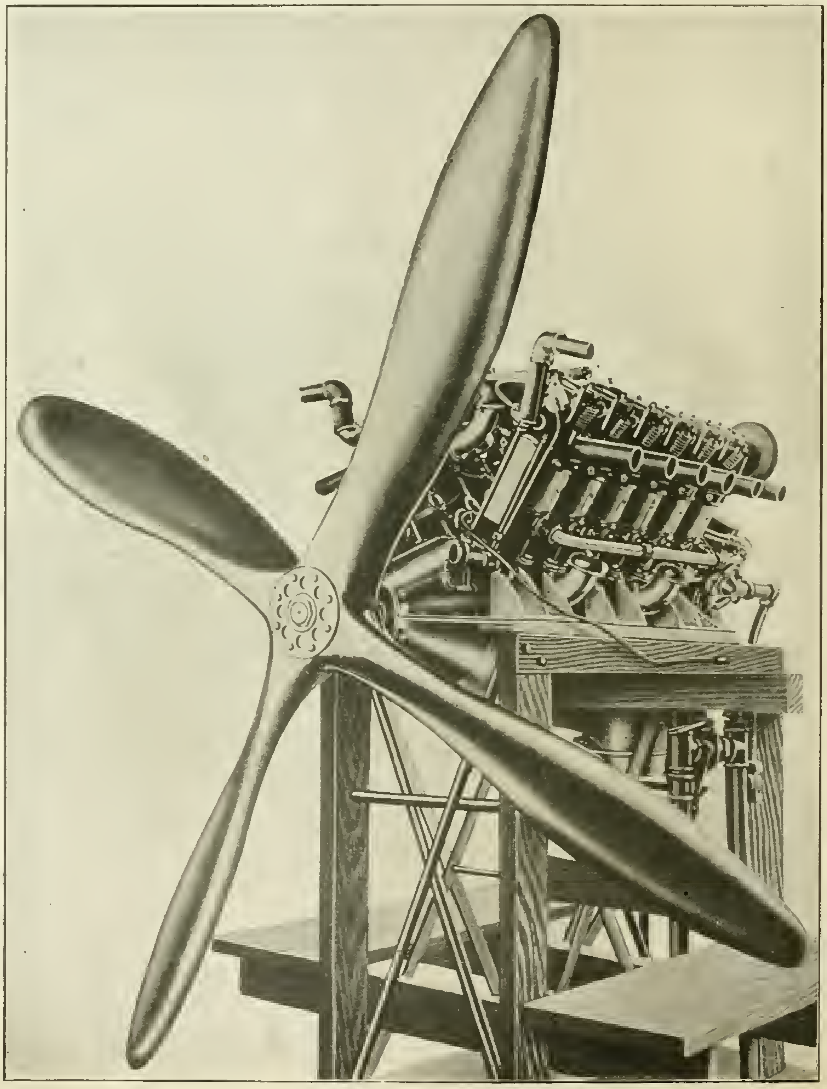
While the Hall-Scott Motor Car Company at West Berkeley, California, had completed the assembly of this equipment, and was planning on quantity production at the time it was decided to go ahead with the United States aircraft program, the diversion of Col. Hall's efforts to the Government service, and the wish of the company not to interfere with the production of the Liberty engine, resulted in the postponement until now, of the final tests, and of putting the A-8 type Hall-Scott engine into production.

The first engine of the A-8 type weighed 1100 pounds. This was equipped with the cast iron cylinders, which were made interchangeable with the 4, 6 and 8 cylinder engines of the Hall-Scott design. The company, however, had ready steel cylinders which have been substituted for those in the original engine, and which together with refinements in other parts reduce the total weight, with a built-in electric starter, to about 800 pounds or 1.75 pounds per horse-power. Besides the cylinders, many other parts are interchangeable with those of Hall-Scott 4, 6, and 8 cylinder engines of the A-5, A-7 and L-6a types.

The bore and stroke of the A-8 Hall-Scott engine is 5 by 7 inches, the same as in the A-5, A-7 and L-6a types.

The photograph of the new twelve-cylinder A-8 engine shows it mounted on the testing block, fitted with the four-blade propeller, and illustrates very clearly the propeller hub of special Hall-Scott design.

The manufacturers anticipate a similar satisfactory performance in actual service in the A-8 type, as has marked the success of the 4, 6, and 8 cylinder machines. It is thought that the A-8, designed to meet the peculiar conditions under which American aeroplane engines must function, and to fit the American manufacturing methods, will rank in performance with the better types of foreign engines.



The Hall-Scott A-8

THE 80 H.P. LE RHONE

THE 80 H.P. Le Rhone engine was manufactured in this country for the Bureau of Aircraft Production by the Union Switch & Signal Co., at Swissvale, Pa., and was used in the Thomas Morse S-4-E and Standard ME1.

The engine consists of two elements, the fixed part and the rotating part.

The fixed part consists of a hollow crankshaft, two engine supporting plates and the carburetor. The carburetor is mounted on the extreme end of the crankshaft and supplies the vaporized mixture through the hollow shaft to the crankcase. On the main supporting plate, which is keyed to the crankshaft, are mounted the magneto, the distributor brush and the oil pump. The short end crank, formed by the extension of the shaft at the propeller end, is located on the crank pin by a taper and round key and is held by a locknut. The crankshaft is machined from high grade chrome-nickel steel forging oil tempered to give high elastic limit and weighs 59.5 lb. before and 11.15 lb. after machining.

The rotating part consists of crankcase, cylinders, intake headers, pistons with connecting rods and thrust block, valve gear and ignition distributor.

Ball bearings are used exclusively for rotating elements. There are nine sets of ball bearings on the crankshaft. All the ball bearings within the crankcase and housings are of the retainer type.

The crankcase is in the form of a steel cylinder provided with nine bosses having threaded openings into which the cylinders are screwed. It is a 40 to 50 per cent. carbon open hearth steel forging, specially heat treated and weighing 274 lb. before, and 28¼ lb. after machining. The propeller shaft is made integral with the front crankcase cover and is machined from a chrome-nickel steel forging, oil tempered. The thrust bearing housing is bolted on the rear of the crankcase, and on it are mounted the magneto and oil pump drive gear and the ignition distributor ring. The crankcase parts revolve about the shaft on three sets of ball bearings, the propeller thrust is absorbed by a double row ball thrust bearing.

The cylinder is a 40 to 50 per cent. carbon open hearth steel forging weighing 62½ lb. before and 7¾ lb. after machining, specially heat treated after rough turning and has cooling fins turned on the outside barrel and on the head. It is provided with a cast iron liner pressed into place.

The cylinder, held in the crankcase by threads cut at its base, is prevented from further rotation about its own axis by a locknut which screws down against the crankcase boss. In each engine assembly, in order to prevent vibration, such cylinders are selected as have equal weights. They must have not only equal total or static weight, but they must also have the same dynamic weight or moment about the center of engine rotation.

The two valves, with seats provided in the steel cylinder head, are actuated by an oscillating rocker arm and a single push rod, the rocker arm being supported on two ball bearings. The valves are made of chrome-nickel steel, and are provided with a screw driver slot for grinding in the 36½ deg. seat. The guide is a cast iron bushing pushed into a steel retaining sleeve which is screwed into the valve cage and held by a locknut.

The valve spring is of steel wire single coil, of 3½ lb. tension with the valve in a closed position. No spring is required except at starting; at a speed of 1,200 r.p.m. the centrifugal force acting on the valve is about 85 lb.

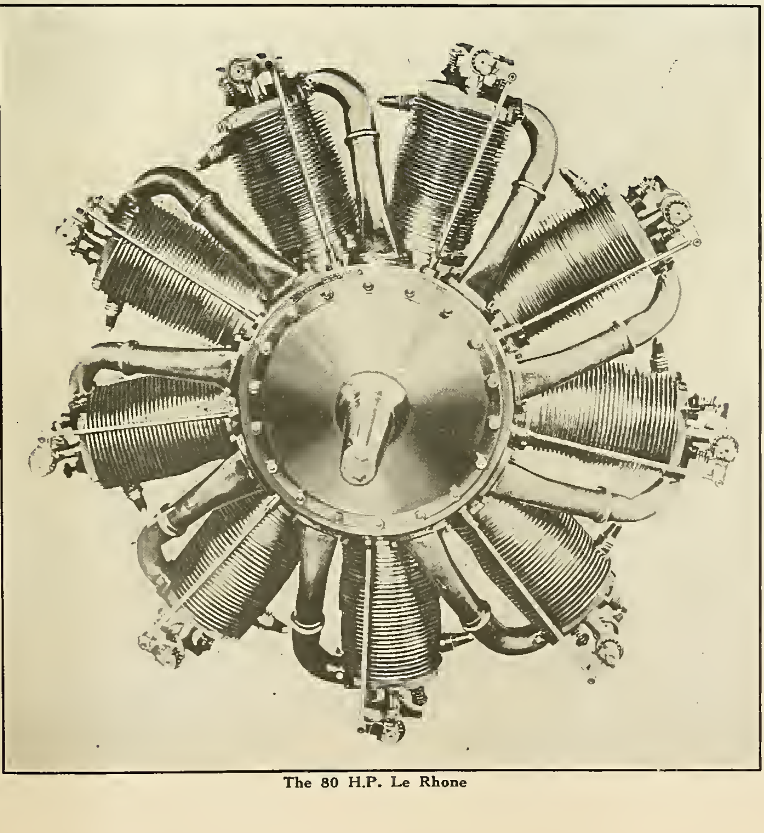
The copper intake headers which convey the carbureted mixture from the crankcase to the inlet valve cages are made in two pieces with a slip joint sealed by a rubber ring.

Specifications

80 H. P. Le Rhone Engine

Type of engine	Radial revolving, four stroke
Rated horsepower	80
Normal speed	1200 r.p.m.
Number of cylinders	9
Cylinder bore	105 mm. (4.1369 in.)
Stroke	140 mm. (5.5120 in.)
Piston displacement	667 cu. in.
Compression ratio	4.8 (70½ lb. absolute)
Order of firing	1-3-5-7-9-2-4-6-8
Method of cooling	Air
Diameter of inlet and exhaust valves	1.8 in.
Diameter of valve stems	0.315 in.
Lift of inlet and exhaust valves	18/32 in.
Carburetor (mixing valve with gate throttle and metering pin)	Block tube type.
Magneto	Fixed spark
Direction of rotation	Clockwise

(*Continued on page* 1283)



The 80 H.P. Le Rhone

CHARACTERISTICS OF LEADING AERO ENGINES

Engine	Rated H.P.	Type	No. of Cyls.	Bore		Stroke		Bore and Stroke Ratio	B.H.P. & R.P.M. at Ground Level				Com-pression Ratio	Piston Speed, Ft. Min.	Order of Firing	Method of Cooling	M. E. P. Lbs. per Sq. In.	Valves per Cylinder							
									Normal		Maximum							Inlet				Exhaust			
				Mm.	Ins.	Mm.	Ins.		B.H.P.	R.P.M.	B.H.P.	R.P.M.						No.	Dia., Ins.	Total Area, Sq. Ins.	Lift, Ins.	No.	Dia., Ins.	Total Area, Sq. Cms.	Lift, Ins.
Curtiss OX5	90	V-90°	8	101.5	4	127	5	1.25 -1	93	1400	95	1450	4.5	1166	1L. 1R, 2L, 2R, 4L, 4R, 3L, 3R.	W	111	1	1.9094	2.0623	.3437	1	1.9094	2.3267	.3878
Curtiss VX	160	V-90°	8	127	5	177.8	7	1.41 -1	206	1350	214	1450	4.71	1575	1L, 1R, 2L, 2R, 4L, 4R, 3L, 3R.	W	110	1	2.7559	3.2366	.3740	1	2.7559	3.2366	.3740
Liberty 8	270	V-45°	8	127	5	177.8	7	1.40 -1	270	1700	285	1850	18%	1980	....	W	115	1	2.5	3.4344	.4375	1	2.5	2.9437	.3750
Liberty 12A	400	V-45°	12	127	5	177.8	7	1.40 -1	400	1700	430	1800	18%	1980	1L. 6R. 5L, 2R, 3L, 4R, 6L, 1R, 2L, 5R, 4L. 3R	W	115	1	2.5	3.4344	.4375	1	2.5	2.9437	.3750
Hispano Suiza	150	V-90°	8	120	4.72	130	5.12	1.08 -1	150	1450	170	1700	4.8 -1	1240	1L, 4R, 2L, 3R, 4L, 1R, 3L, 2R	W	114	1	1.9685	2.4350	.3937	1	1.9685	2.4350	.3937
Hispano Suiza	180	V-90°	8	120	4.72	130	5.12	1.08 -1	180	1700	205	1800	5.3 -1	1450	1L, 4R, 2L, 3R, 4L, 1R, 3L, 2R	W	122	1	1.9685	2.9350	.3937	1	1.9685	2.4350	.3937
Hispano Suiza	300	V-90°	8	140	5.5	150	5.90	1.07 -1	300	1600	340	1800	5.3 -1	1578	1L, 4R, 2L, 3R, 4L, 1R, 3L, 2R	W	125	1	......	......	.....	1	......	......	.....
LeRhone	80	Rotary	9	106	4.13	140	5.51	1.32 -1	80	1200	85	1300	1.33-1	1100	1, 3, 5, 7, 9, 2, 4. 6, 8	A	81	1	1.5629	1.7313	.3593	1	1.5629	1.4492	.2952
Gnome	100	Rotary	9	110	4.33	150	5.90	1.36 -1	103	1200	110	1300	4.0 -1	1180	1, 3, 5, 7, 9, 2, 4. 6, 8	A	88.7	0	......	......	.....	1	......	......	.....
ABC Wasp	170	Radial	7	114.3	4.5	.....	5.9	1.31 -1	170	1750	200	1850	4.025	1690	1, 3, 5, 7, 2, 4, 6	A	115	1	2.17	3.33	.4700	2	1.338	2.4800	.2950
ABC Dragon-Fly	320	Radial	9	140	5.5	165	6.5	1.18 -1	320	1650	350	1750	4.025	1785.5 1650	1, 3, 5, 7, 9, 2, 4, 6, 8	A	114	1	2.6559	5.4537	.6535	2	1.6929	2.2992	.4330
BR1	150	Rotary	9	.....	6.72	.....	6.66	1.42 -1	154	1250	156	1300	5.9 -1	1394	1, 3, 5, 7, 9, 2. 4, 6, 8	A	94	1	1.77	2.41	.4300	1	2.000	2.7300	.4300
BR 2	200	Rotary	9	.....	5.51	.....	7.08	1.285-1	238	1300	242	1350	5.3 -1	1475	1, 3, 5, 7, 9, 2, 4, 6, 8	A	95.2	1	2.47	3.9554	.5100	1	2.28	3.6510	.5100
Beardmore	160	Vert.	6	142	....	175	...	1.23 -1	178	1350	192	1450	4.55-1	1135	1, 5, 3, 6, 2. 4	W	103	1	2.559	......	.....	1	2.5590	......	.....
Galloway	240	Vert.	6	145	5.71	190	7.48	1.31	236	1400	250	1500	4.96-1	1558	1, 5, 3, 6, 2, 4	W	116	1	2.7165	4.0455	.4724	2	1.8110	4.2346	.4724
Siddeley	240	Vert.	6	.....	5.71	.....	7.48	1.31	240	1400	250	1500	5 -1	1558	1, 5, 3, 6, 2, 4	W	118.1	1	2.5984	3.9060	.4724	2	1.7322	5.2080	.4724
Hispano	150	V-90°	8	.....	4.72	.....	5.12	1.08 -1	156	1500	165	1600	4.8 -1	1280	1, 4, 2, 3. 4, 1, 3, 2	W	114.75	1	1.9685	2.4350	.3937	1	1.9685	2.4350	.3900
Hispano	180	V-90°	8	.....	4.72	.....	5.12	1.08 -1	220	2000	225	2100	5.3 -1	1707	1, 4, 2, 3, 4, 1, 3, 2	W	121.8	1	1.9685	2.4350	.3937	1	1.9685	2.4350	.3900
Rolls-Royce Falcon 3	220	V-60°	12	.....	4.00	.....	5.75	1.44 -1	270	2200	280	2300	5.3 -1	2108	Rbt. 1, 2.5, 4, 3, 1, 6, 5, 2, 3, 4, 6	W	114	1	1.7496	2.4211	.4437	1	1.7496	2.4211	.4400
Rolls-Royce Eagle 8	360	V-60°	12	......	4.5	.....	6.5	1.44 -1	350	1800	360	1900	5.3 -1	1950	Rht. 1, 2, 5, 4. 3. 1, 6, 5, 2, 3, 4, 6	W	124	1	2.0000	2.9155	.4850	1	2.0000	2.9155	.4800
Sunbeam Arab	200	V-90°	8	120	4.72	130	5.12	1.08 -1	217	2000	224	2100	5.3 -1	1710	1, 1A. 2. 2A, 4, 4A, 3, 3A	W	115	1	2.126	2.3631	.3543	2	1.2598	2.8088	.3543
Sunbeam Maori	250	V-60°	12	.....	3.94	.....	5.31	1.35 -1	265	2100	280	2200	5.6 -1	......	1, 5. 3, 6, 2, 4	W	125	2	......	......	.3543	2	......	......	.3500
Sunbeam Cossack	320	V-60°	12	.....	4.33	.....	6.30	1.45 -1	350	2000	364	2100	5 -1	2100	1, 5, 3, 6. 2, 4	W	124	2	1.6142	3.6952	.3543	2	1.6142	1.8476	.3500
Clerget 92	110	Rotary	9	120	4.72	.....	6.30	1.33 -1	122	1250	123	1300	4.36-1	1260	1, 3, 5, 7, 9, 2, 4, 6, 8	A	78	1	1.5748	1.9423	.3937	1	1.9685	2.8031	.4528
Clerget 92	130	Rotary	9	.....	4.72	.....	6.30	1.33 -1	127	1250	....	....	4.56-1	1312	1, 3, 5, 7, 9, 2, 4, 6, 8	A	81	1	1.692	2.24	.3900	1	1.9685	3.038	.4527
Hispano*	180	V-90°	8	.....	4.72	.....	5.12	1.08 -1	208	2000	225	2100	5.3 -1	1707	1, 4, 2, 3, 4, 1, 3, 2	W	121.8	1	1.9685	2.4350	.3900	1	1.9685	2.4350	.3931
Hispano*	200	V-90°	8	.....	4.72	.....	5.12	1.08 -1	220	2000	215	2100	4.8 -1	1707	1, 4, 2, 3, 4, 1, 3, 2	W	115	1	1.9685	2.4350	.3900	1	1.9685	2.4350	.3937
Lorraine Dietrich	275	V-90°	8	120	4.72	175	6.89	1.46 -1	278	1650	....	....	......	......	....	....	......	.	......	......	......	.	......	......	.....
Fiat A12bis	275-300	Vert.	6	160	6.3	180	.....	1.12	304-290	1600	325	1760	4.31-1	1653	1, 5, 3, 6, 2, 4	W	105	2	2.00	5.5180	.4300	2	2.0078	5.518	.4375
Fiat A14	600	Vert.	12	.....	6.69	.....	8.27	1.235-1	700	1500	725	1600	......	......	....	W	108	.	......	......	.....	.	......	......	.....
I.F. V5	200	Vert.	8	130	....	190	....	.....	250	1400	268	1600	5	1995	....	W	107.6	.	......	......	.....	.	......	......	.....
Spa 6A	200	......	6	135	....	170	....	....	210	1600	225	1700	5	1895	....	....	116.6	.	......	......	.....	.	......	......	.....
Benz	220	Vert.	6	145	....	190	....	....	230	1400	252	1650	4.93	1745	....	W	113	.	2.244	......	.....	.	2.244	......	.....
Maybach	200	Vert.	6	150	....	190	....	....	200	1200	....	....	......	1496	....	W	107.4	.	1.8998	......	.....	.	1.3779	......	.....
Mercedes	160	Vert.	6	140	....	160	....	....	150	1250	....	....	4.8-4.52	1312	....	....	105.2	.	......	......	.....	.	......	......	.....
Mercedes	260	Vert.	6	160	....	180	....	....	252	1400	260	1500	4.94	1635 at 1400	....	....	107.5	.	2.3622	......	.....	.	2.3622	......	.....
Oberursel	110	......	....	.....	....	.....	....	....	.....	....	....	....	......	......	....	....	......	.	......	......	.....	.	......	......	.....

ENGINE	CARBURETOR			MAGNETO				OIL PUMP			WATER PUMP			AIR PUMP			Ratio of Gear Reduction	Speed of Propeller	Tractor or Pusher	OVERALL DIMENSIONS		
	No.	Type	Weight Each, Lbs.	No.	Type	Speed x E. S.	Weight Each, Lbs.	No.	Type	Weight, Lbs.	No.	Type	Weight, Lbs.	No.	Type	Weight, Lbs.				Length, M/M.	Width, M/M.	Height, M/M.
Curtiss OX5	1	Zenith Duplex	4.2	1	Berling	2	21	1	Gear	.....	1	Centrif.	.....	.	Nil	.....	Nil	E. S.	Either	1408	753	841
Curtiss VX	2	Zenith Duplex	.....	1	.....	2	.....	3	Gear	.....	1	Centrif.	.....	.	Nil	.....	Nil	E. S.	.....	.....	.....	.....
Liberty 8	1	Zenith Duplex	7	1	Twin Delco Generator, 8-volt	1.5	.....	3	Gear	.....	1	Centrif.	.....	1	Plunger	.....	Nil	E. S.	Either	.....	.....	1020
Liberty 12A	2	Zenith Duplex U.S. 52	.....	1	Twin Delco Generator, 8-volt	1.5	.....	3	Gear	.....	1	Centrif.	.....	1	Plunger	.....	Nil	E. S.	Either	1755	.....	1020
Hispano Suiza	1	Zenith Duplex 48 D.C.	7.0	2	8-Cyl. Dixie Transverse	2	.....	1	Eccentric Vane Type	.....	1	Centrif.	.....	1	Plunger	.....	Nil	E. S.	Either	1308	851	832
Hispano Suiza	1	Zenith Duplex 58 D.C.	9.5	2	8-Cyl. Dixie Transverse	2	.....	1	Eccentric Vane Type	.....	1	Centrif.	.....	1	Plunger	.....	Nil	E. S.	Either	1308	851	832
Hispano Suiza	1	Zenith Duplex 58 D.C.	9.5	2	8-Cyl. Dixie Transverse	2	.....	1	Gear	.....	1	Centrif.	.....	1	Plunger	.....	Nil	E. S.	Either	.....	.....	.....
LeRhone	1	Mixing Valve	4.19	1	A.D.S. 26° Early	9/4	9.10	1	Plunger	4.125	.	.....	.....	.	.....	.....	Nil	E. S.	Either	.....	.....	.....
Gnome	1	Mixing Valve	.....	1	.....	9/4	.....	1	Two Plunger	.....	.	.....	.....	.	.....	.....	Nil	E. S.	Either	.....	.....	.....
ABC Wasp	2	A. B. C. Injectors	.....	2	P. L. 7. M. L. P.	1.75	.....	1	Gear	.....	.	.....	.....	.	.....	.....	Nil	E. S.	T.	35.7"	42.20"	42.20"
ABC Dragon-Fly	2	H. C. 8	.....	2	M. L. 9	1.18	13.5	1	Plunger Distributed	.....	.	.....	.....	.	.....	.....	.....	E. S.	T.	1070	1232	1207
BR1	1	Block Tube	5	2	A. D. S. M. L.	2.25	10	1	Plunger	6.63	.	Nil	.....	1	Plunger	4.7	Nil	E. S.	Either	43.5"	47.50"	41.57"
BR 2	1	Block Tube	.....	2	M. L.	.....	10	1	Plunger	6,63	.	Nil	.....	1	Plunger	.....	Nil	E. S.	Either	.....	.....	.....
Beardmore	2	Zenith	5.75	2	D. U. 6 S.	1.5	16	1	.....	.....	1	Centrif.	4.9	.	.....	.....	Nil	E. S.	Either	57.08"	19.92"	31.88"
Galloway	2	48 Zenith RA	3.25	2	E. M. 6	1.5	15	1	Rotary	4.06	1	Centrif.	6.51	1	Plunger	.88	Nil	E. S.	Either	67.32"	20.07"	42.91"
Siddeley	2	Zenith	4.2	2	E. M. 6	1.5	15	2	Gear	4.1	1	Centrif.	7.2	1	Plunger	.7	Nil	.....	Either	69.88"	24.09"	43.62"
Hispano	1	Zenith Duplex 48 D.C.	7.0	2	1A8S	E. S.	17.75 18.12	1	Eccentric Vane	.....	1	Centrif.	2.69	1	Plunger	15 oz.	Nil	E. S.	Either	51.53"	33.46"	32.67"
Hispano	1	Zenith Duplex 58 D.C.	9.5	2	1A8S. 1AB	E. S.	18.12 17.75	2	Eccentric Vane	.....	1	Centrif.	2.69	.	Plunger	.....	Nil	E. S.	Either	47.24"	33.46"	33.34"
Rolls-Royce Falcon 3	2	R.R.C.H. 38M.	.....	2	Watford	1.5	14.25	1	Rotary	.....	1	Centrif.	.....	2	Plunger	2.75	.59–1	1300 r.p.m.	Either	72.04"	37.24"	42.00
Rolls-Royce Eagle 8	2	R.R.C.H. Duplex 42 m/m.	13.000	4	Watford	1.5	14.25	2	Gear	8.75	1	Centrif.	4.625	1	Plunger	2.875	.6–1	1080	Either	75.98"	42.52"	48.03
Sunbeam Arab	1	C.H.H.C. 7	.....	2	B.T.H. A8S	E. S.	12.8	3	Gear	.....	1	Centrif.	3	1	Plunger	.....	45–27	1200	T.	1105	810	903
Sunbeam Maori	4	C.H.B.Z.S. 42 m/m.	.....	4	W.B.G.	1.5	19.1	3	Gear	.....	1	Centrif.	.....	1	Plunger	.....	2–1	½ E. S.	Either	55.11"	35.46	33.85
Sunbeam Cossack	4	C.H.B.Z.S. 42 m/m.	.....	4	B6 or W.B.G.	1.5	19.1	3	Gear	.....	1	Centrif.	.....	1	Plunger	.....	2–1	½ E. S.	Either	61.81"	37.79	38.89
Clerget 92	1	Block Tube Bush D.A.L.	4.41	2	A.D.S.	E. S.	9–10	1	Gear	6.63	.	.....	.....	1	Plunger	4.8	.....	E. S.	Either	36.22"	40.15"	40.15"
Clerget 92	1	Block Tube	5.0	2	A.D.S.	2.25	9–10	1	Plunger	6.63	.	Nil	.....	1	Plunger	4.7	Nil	E. S.	Either	36.22"	40.15" Dia.	40.15"
Hispano*	1	Zenith Duplex 58 D.C.	9.5	2	1ABS. 1AB	E. S.	18.12 17.75	2	Eccentric Vane	.....	1	Centrif.	2.69	1	Plunger	15 oz.	Nil	E. S.	Either	47.24"	33.46"	33.34"
Hispano*	1	Zenith Duplex 58 D.C.	9.5	2	S.E.V.	E. S.	16–3	1	Eccentric Vane	.....	1	Centrif.	.....	1	Plunger	13 oz.	24x41 or 21x28	1170 or 1500	Either	51.18"	33.46"	33.26"
Lorraine Dietrich	.	.....	.....	.	.....	.....	.....	.	.....	.....	.	.....	.....	.	.....	.....	.....	.....	.....	.....	.....	.....
Fiat A12bis	1	Siemens	.....	2	6-Cyl. Dixie 60-V.	1.5	.....	3	Gear	.....	1	Centrif.	.....	1	Plunger	.....	Nil	E. S.	Either	.....	.....	.....
Fiat A14	.	.....	.....	.	.....	.....	.....	.	.....	.....	1	Centrif.	.....	.	.....	.....	.....	.....	.....	.....	.....	.....
I.F. V5	.	.....	.....	2	.....	.....	.....	.	.....	.....	.	.....	.....	.	.....	.....	.....	1400	Either	.....	.....	.....
Spa 6A	.	.....	.....	2	.....	.....	.....	.	.....	.....	.	.....	.....	.	.....	.....	.....	1600	Either	.....	.....	.....
Benz	.	.....	.....	2	2H6 Bosch	.....	.....	.	Gear	.....	.	Centrif.	.....	.	.....	.....	.....	.....	.....	.....	.....	.....
Maybach	2	Maybach	.....	2	2H6 Bosch	.....	.....	1	Plunger	.....	.	Axial Turb.	.....	.	.....	.....	.....	.....	.....	.....	.....	.....
Mercedes	.	Duplex	.....	2	2H6 Bosch	.....	.....	2	Plunger	.....	.	.....	.....	.	.....	.....	.....	.....	.....	.....	.....	.....
Mercedes	1	Mercedes	.....	2	Bosch	.....	.....	.	Mercedes 4-Plunger	.....	.	Axial Turb.	.....	.	.....	.....	.....	.....	.....	.....	.....	.....
Oberursel	.	.....	.....	.	.....	.....	.....	.	.....	.....	.	.....	.....	.	.....	.....	.....	.....	.....	.....	.....	.....

Engine	Total Fuel & Oil per Hr.		Consumption per B.H.P. Hour						Weight of Engine Dry		Weight of Engine in Running Order Less Fuel Oil and Tanks		Weight of Engine with Fuel Oil and Tanks for 6 Hours Running		Torque in Lbs. Ft.	Estimated B.H.P. at				Estimated Fuel Consumptions Pints per Hour Ground Level Carburetor Adjustments, No Altitude Control			
			Pints		Lbs.		Combined																
	Pts.	Lbs.	Fuel	Oil	Fuel	Oil	Pts.	Lbs.	Lbs.	Lbs./B.H.P.	Lbs.	Lbs./B.H.P.	Lbs.	Lbs./B.H.P.		6000 Ft.	10.000 Ft.	15,000 Ft.	20,000 Ft.	6000 Ft.	10,000 Ft.	15,000 Ft.	20.000 Ft.
Curtiss OX5	48.66	44.16	.51	.018	.46	.02	.528	.48	385	4.2	445	4.8	6765	7.3	371	76	67.3	57.5	49.4	42.6	40.1	37.1	34 4
Curtiss VX	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Liberty 8	182.24	182.2	.606	.0214	.517	.050	.627	.597	575	2.12	....	....	....	....	....	260	181	148	116	112	100	87	75
Liberty 12A	192.8	102.8	.565	.0199	.509	.037	.585	.546	845	2.11	1151.5	2.88	....	....	....	320	272	220	172	163	144	125	108
Hispano Suiza	....	85.5	....	....	.52	.05	....	.57	440	2.93	....	....	....	....	....	....	....	....	....	....	....	....	....
Hispano Suiza	....	127.2	....	....	.52	.056	....	.576	485	2.69	....	....	....	....	....	....	....	....	....	....	....	....	....
Hispano Suiza	....	....	....	....	....	....	....	....	596	1.98	....	....	....	....	....	....	....	....	....	....	....	....	....
LeRhone	....	....	....	....	.56	.19	....	.75	245	3.05	....	....	....	....	....	....	....	....	....	....	....	....	....
Gnome	....	....	....	....	.72	.18	....	.90	270	2.7	....	....	....	....	....	....	....	....	....	....	....	....	....
ABC Wasp	94 8	85	.55	.026	.495	.019	.567	.514	260	1.53	260	1.53	820	4.82	510	138.11	122.24	104.37	89.67	83.53	78.56	72.68	67.34
ABC Dragon-Fly	....	191.5	....	....	.56	.02	....	....	600	1.88	600	1.88	....	....	1019	256	218	176	138	149	134	116	100
BR1	118.2	109.75	.661	.097	.59	.109	.758	.690	405	2.6	405	2.6	1129.35	7.8	655	129	114.2	97.5	83.7	93.7	88.1	81.5	75.5
BR 2	176.2	162	.7	.066	.63	.074	.766	.702	475	2	475	2	1544	6.5	961	196.8	174.2	148.75	127.8	146.2	137.5	127.2	117.8
Beardmore	108.5	98.96	.52	.032	....	....	.609	.552	592	3.3	713	4	1366	7.6	692	147.2	130.3	111.25	95.6	93.7	88.1	81.5	75.5
Galloway	143.2	130.45	.58	.027	.52	.03	.607	.55	690	2.95	843	3.57	1704	7 2	885	195.2	172.75	147.5	126.7	124.2	116.8	108	100.1
Siddeley	147.6	135.85	.56	.055	.50	.062	.615	.562	625	2.6	781	3.25	1677.6	7.0	900	198.5	175.7	150	129	122	114.7	106.2	98.4
Hispano	96.5	88.2	.58	.038	.52	.043	.618	.563	455	2.9	657.4	4.29	1239.5	7.9	546	129	114.2	97.5	83.8	82.2	77.3	71.5	66.25
Hispano	138.6	127.8	.58	.05	.52	.056	.03	.576	510	2.32	653	2.97	1492	6.67	583	182	161	137.5	118	115.8	109	100.8	93.5
Rolls-Royce Falcon 3	161.15	146.6	.56	.026	.53	.026	.586	.559	723	2.68	912	3.38	1880	6.9	694	227.4	201.3	171.8	147.6	139.8	131.5	121.6	112.7
Rolls-Royce Eagle 8	201 7	186.2	.56	.025	.5	.028	.585	.528	933	2.66	1177	3.37	2406	6.9	1020	289.5	256.2	218.75	188	178	167.4	154.8	143.5
Sunbeam Arab	116.3	106.46	.50	.036	.45	.04	.536	.49	550	2.5	686	3.16	1389	6.4	570	179.5	158.8	135.6	116.5	98.5	92.6	85.7	79.4
Sunbeam Maori	161.2	141.97	.56	.023	.51	.026	.583	.536	890	3.3	1065	3.95	2002	7.8	662	219	194	165.6	142.3	136.2	128.1	118.5	109.8
Sunbeam Cossack	208	189.9	.56	.034	.50	.038	.594	.538	1118	3.2	1345	3.8	2598	7.4	919	280.5	256.2	218.75	188	178	167.4	154.8	143.5
Clerget 92	97.5	91.35	.667	.131	.6	.147	.798	.747	367	3	367	3	970	8	512	101	89.3	76.25	65.5	74	69.6	64.4	59.6
Clerget 92	99.05	92.26	.67	.109	.60	.123	.779	.723	400	3.15	400	3.15	1009	8	533	105	93	79.4	68.2	77.3	72.7	67.3	62.3
Hispano*	138.6	127.8	.58	.05	.52	.056	.63	.576	510	2.32	653	2.97	1492	6.67	583	182	161	137.5	118	115.8	109.0	100.8	93.5
Hispano*	137.8	126.9	.6	.06	.54	.067	.66	.607	503	2.42	638	3.1	1475.6	7.8	546	172	152.25	130	111.7	113.3	106.6	98.6	91.3
Lorraine Dietrich	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Fiat A12bis	162.8	147.6	.65	.024	.49	.027	.574	.517	928	3.32	1110	3.96	2084	7.44	920	215	190.3	162.5	139.6	141.6	133.2	123.2	114.2
Fiat A14	396.7	363.7	.52	.012	.47	.047	.562	.517	1565	2.36	2020	2.9	4420	6.3	2450	580	512.4	430.75	370.6	306.2	313.7	290.25	268.9
I.F. V5	....	....	....	....	.485	.033	....	....	825	3.95	....	....	....	....	....	....	....	....	....	....	....	....	....
Spa 6A	....	....	....	....	.473	.033	....	....	539	3.21	....	....	....	....	....	....	....	....	....	....	....	....	....
Benz	....	....	....	....	.653	.02	....	....	829	3.68	....	....	....	....	....	....	....	....	....	....	....	....	....
Maybach	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Mercedes	....	....	....	....	.6	.029	....	....	618	3.86	....	....	....	....	....	....	....	....	....	....	....	....	....
Mercedes	....	....	....	....	.605	.032	....	....	935	3.75	....	....	....	....	....	....	....	....	....	....	....	....	....
Oberursel	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....

HONOR ROLL OF THE AIR SERVICE

The following officers of the American flying arm have been decorated for conspicuous bravery in action. The list, which includes both American and foreign awards, has been carefully compiled from available official sources, but the records are not yet complete.

Distinguished Service Cross

Thomas J. Abernathy	2d Lieut
Perry H. Aldrich	1st Lieut.
Arthur H. Alexander	1st Lieut.
Sterling C. Alexander	1st Lieut.
Gardner Philip Allen	1st Lieut. C. A. C.
Flynn L. A. Andrew	1st Lieut.
Paul Armengaud	Major
Rodney M. Armstrong	1st Lieut.
Dogan H. Arthur	1st Lieut.
Benjamin L. Atwater	1st Lieut.
Walter L. Avery	1st Lieut.
Philip R. Babcock	Captain
David H. Backus	1st Lieut.
Wm. T. Badham	1st Lieut.
Paul Frank Baer	1st Lieut.
Ralph S. Bagby	1st Lieut.
Herbert B. Bartholf	1st Lieut.
Byrne V. Baucom	1st Lieut.
James D. Beane	1st Lieut.
David C. Beebe	2d Lieut.
Franklin B. Bellows	2d Lieut.
William Belzar	2d Lieut.
Otto E. Benell	2d Lieut.
Louis G. Bernheimer	1st Lieut.
Chas. Raymond Blake	1st Lieut.
Erwin R. Bleckley	2d Lieut.
Hugh D. Bloomfield	1st Lieut.
Allen F. Bonnalie	1st Lieut.
Horace L. Borden	2d Lieut.
Lloyd G. Bowers	1st Lieut.
Samuel C. Bowman	2d Lieut.
Theodore E. Boyd	1st Lieut.
Lewis H. Brereton	Lt. Colonel
Hugh Brewster	1st Lieut.
Arthur R. Brooks	1st Lieut.
Wm. E. Brotherton	2d Lieut.
Mitchell H. Brown	2d Lieut.
Harold H. Buckley	Captain
Edward Buford, Jr.	Captain
Valentine Burger	2d Lieut.
James S. D. Burns	2d Lieut.
Byron T. Burt, Jr.	1st Lieut.
Alan Butt	1st Lieut.
Douglas Campbell	Captain
George D. Carrol	1st Lieut.
John R. Castleman	1st Lieut.
Reed M. Chambers	Captain
Chas. W. Chapman	2d Lieut.
Kenneth S. Clapp	1st Lieut.
Sheldon V. Clarke	1st Lieut.
Wallace A. Coleman	1st Lieut.
Harvey Conover	1st Lieut.
Everett R. Cook	Captain
Weir H. Cook	1st Lieut.
Hamilton Coolidge	Captain
John E. Cousins	Captain
Edward P. Curtis	1st Lieut.
Edward B. Cutter	1st Lieut.
Ralph E. de Castro	1st Lieut.
Willis A. Diekema	Captain
Raymond P. Dillon	1st Lieut.
Charles R. D'Olive	1st Lieut.
Kingman Douglass	1st Lieut.
Meredith L. Dowd	2d Lieut.
Chas. W. Drew	1st Lieut.
Arthur William Duckstein	1st Lieut.
Arthur C. Esterbrook	1st Lieut.
Warren Edwin Eaton	1st Lieut.
Robert P. Elliott	1st Lieut.
William P. Erwin	1st Lieut.
J. Dickinson Este	1st Lieut.
Leo C. Ferrenbach	1st Lieut.
Howard F. Fleeson	1st Lieut.
Justin P. Follette	1st Lieut.
Hugh L. Fontaine	1st Lieut.
Christopher W. Ford	Captain
Wm. F. Frank	1st Lieut.
John Frost	1st Lieut.
George Willard Furlow	1st Lieut.
Bradley J. Gaylord	1st Lieut.
Harold H. George	1st Lieut.
Ernest A. Giroux	1st Lieut.
Harold E. Goettler	1st Lieut.
George E. Goldthwaite	1st Lieut.
Alfred A. Grant	Captain
Fred C. Graveline	Sergeant
Charles G. Grey	Captain
Andre P. Gundelach	1st Lieut.
Murray K. Guthrie	1st Lieut.
James Norman Hall	Captain
Lloyd A. Hamilton	1st Lieut.
Leonard C. Hammond	Captain
Percival G. Hart	2d Lieut.
Harold E. Hartney	Major
Benjamin P. Harwood	1st Lieut.
Frank K. Hays	2d Lieut.
James A. Healey	1st Lieut.
Phil. A. Henderson	1st Lieut.
J. A. Higgs	1st Lieut.
Maury Hill	Captain
Raymond C. Hill	1st Lieut.
Roger W. Hitchcock	1st Lieut.
Lansing C. Holden	1st Lieut.
Spesserd L. Holland	1st Lieut.
William T. Hoover	1st Lieut.
Donald Hudson	1st Lieut.
D. G. Hunter	1st Lieut.
Frank O'Driscoll Hunter	1st Lieut.
Livingston Gilson Irving	1st Lieut.
John N. Jeffers	1st Lieut.
Thomas M. Jersey	1st Lieut.
Arthur H. Jones	1st Lieut.
Clinton Jones	2d Lieut.
John W. Jordan	2d Lieut.
Clarence C. Kable	1st Lieut.
Samuel Kaye, Jr.	1st Lieut.
Asher E. Kelty	1st Lieut.
Geo. C. Kennedy	1st Lieut.
Field E. Kindley	1st Lieut.
Clair A. Kinney	1st Lieut.
Wilbert E. Kinsley	2d Lieut.
James Knowles	1st Lieut.
John H. Lambert	1st Lieut.
German De Freest Larner	1st Lieut.
Walter R. Lasson	Captain
John B. Lee	2d Lieut.
Robert Lindsay	1st Lieut.
Frank A. Llewellyn	1st Lieut.
K. P. Littauer	Major
William O. Lowe	2d Lt., U. S. M. C.
Francis B. Lowry	2d Lieut.
Frank Luke, Jr.	1st Lieut.
Frank Luke, Jr.	1st Lieut.
Joel H. McClendon	1st Lieut.
Cleveland W. McDermott	2d Lieut.
James A. McDevitt	1st Lieut.
Harry O. McDougall	1st Lieut.
Elmore E. McKay	2d Lieut.
James R. McKay	1st Lieut.
Ora R. McMurry	1st Lieut.
John MacArthur	2d Lieut.
Winfred C. MacBrayne	1st Lieut.
James E. Manning, Jr.	1st Lieut.
Russell L. Maughan	1st Lieut.
James A. Meissner	Major
John F. Michenor	1st Lieut.
John Mitchell	Captain
William Mitchell	Brig. General
Edward Russell Moore	1st Lieut.
Edw. M. Morris	2d Lieut.
Oscar B. Myers	1st Lieut.
Roland H. Neel	2d Lieut.
Harlow P. Neibling	1st Lieut.
George R. Nixon	1st Lieut.
Sigbert A. G. Norris	2d Lieut.
Fred W. Norton	1st Lieut.
Stephen H. Noyes	1st Lieut.
Alan Nutt	1st Lieut.
Paul J. O'Donnell	2d Lieut.
Ralph A. O'Neill	1st Lieut.
Edward Orr	1st Lieut.
Richard C. M. Page	1st Lieut.
Joseph A. Palmer	2d Lieut.
William W. Palmer	1st Lieut.
Alfred B. Patterson, Jr.	1st Lieut.
Karl C. Payne	1st Lieut.
Elmer Pendell	1st Lieut.
Josiah Pegues	1st Lieut.
David McK Peterson	Major
Glen Phelps	1st Lieut.
Geo. R. Phillips	1st Lieut.
Chas. W. Plummer	2d Lieut.
Lewis C. Plush	1st Lieut.
Britton Polley	1st Lieut.
William Thomas Ponder	1st Lieut.
Carl W. Porter	2d Lieut.
Charles P. Porter	2d Lieut.
Kenneth L. Porter	2d Lieut.
Glen A. Preston	2d Lieut.
Percy Rivington Pyne	1st Lieut.
John J. Quinn	1st Lieut.
Joseph C. Raible, Jr.	1st Lieut.
John I. Rancourt	1st Lieut.
Howard G. Rath	1st Lieut.
Robert F. Raymond, Jr.	1st Lieut.
Clearton H. Reynolds	Captain
John N. Reynolds	Lt. Colonel
James M. Richardson	2d Lieut.
Edward V. Rickenbacker	Captain
Paul N. A. Rooney	1st Lieut.
Hermon C. Rorison	1st Lieut.
Cleo J. Ross	1st Lieut.
Edward W. Rucker, Jr.	Captain
Leslie J. Rummell	1st Lieut.
Alexander P. Schenck	1st Lieut.
Karl J. Schoen	1st Lieut.
Arthur P. Seaver	1st Lieut.
Cecil G. Sellers	Captain
Sumner Sewall	1st Lieut.
Richard B. Shelby	1st Lieut.
Louis C. Simon, Jr.	2d Lieut.
John H. Snyder	1st Lieut.
Carl Spatz	Major
Richard Wilson Steele	2d Lieut.
John H. Stevens	2d Lieut.
John Y. Stokes, Jr.	1st Lieut.
Penrose V. Stout	1st Lieut.
Wm. H. Stovall	1st Lieut.
Victor H. Strahm	Captain
W. J. R. Taylor	1st Lieut.
Walton B. Ten Eyck, Jr.	2d Lieut.
William Thaw	Lt. Colonel
Fred A. Tillman	2d Lieut.
Edgar G. Tobin	Captain
Wm. H. Vail	1st Lieut.
Remington D. Vernam	1st Lieut.
James E. Wallis	Captain
William W. Waring	1st Lieut.
Donald B. Warner	1st Lieut.
Pennington H. Way	2d Lieut.
Joseph F. Wehner	1st Lieut.
Wilbert W. White	1st Lieut.
Alan F. Winslow	2d Lieut.
Chester E. Wright	1st Lieut.

Distinguished Service Medal

Charles T. Menoher	Maj. General
Mason M. Patrick	Maj. General

Distinguished Service Order—British

A. F. Bonnallie	1st Lieut.

Distinguished Flying Cross—British

H. L. Bair	1st Lieut.
M. L. Campbell	1st Lieut.
Henry Robinson Clay, Jr.	1st Lieut.
John O. Donaldson	2d Lieut.
Floyd Andrews Hamilton	1st Lieut.
Charles L. Heater	1st Lieut.
Thomas John Herbert	1st Lieut.
P. T. Iaccaci	1st Lieut.
James Alfred Keating	1st Lieut.
Field E. Kindley	1st Lieut.
Reed G. Landis	Captain
Frederick E. Luff	1st Lieut.
Elliott W. Springs	Captain
George Augustus Vaughn	1st Lieut.

Legion of Honor—French (Commander)

Maj. Gen. Charles T. Menoher
Brig. Gen. William Mitchell

Cross of the Legion of Honor—French

Charles W. Miller	2d Lieut.
David E. Putnam	1st Lieut.

Croix de Guerre—French

Thomas J. Abernathy	2d Lieut.
James H. Ackerman	1st Lieut.
Floyd H. Allport	2d Lieut.
Paul Frank Baer	1st Lieut.
Walter V. Barneby	1st Lieut.
James Henry Baucham	??°
James D. Beane	1st Lieut.
Charles John Biddle	Major
Stewart Bird	1st Lieut.
William O. Butler	Captain
Douglas Campbell	Captain
Richard Carside	1st Lieut.
Thomas G. Cassady	1st Lieut.
Chas. Wesley Chapman, Jr.	2d Lieut.
Arthur J. Coyle	Captain
Kenneth P. Culbert	2d Lieut.
Karl H. Eymann	2d Lieut.
Charles C. Fleet	1st Lieut.
Christopher Wm. Ford	Captain
Ernest A. Giroux	1st Lieut.
James A. Healy	1st Lieut.
Raymond C. Hill	1st Lieut.
Amos L. Hopkins	1st Lieut.
Sidney I. Howell	1st Lieut.
Frank O'Driscoll Hunter	1st Lieut.
Arthur H. Jones	1st Lieut.
Henry Jones	1st Lieut.
Henry P. Jones	Sergeant
Charles Maury Jones	Captain
Charles Wayne Kerwood	Sergeant
Charles Kinsolving	1st Lieut.
George Marion Kyle	1st Lieut.
G. DeFreest Larner	1st Lieut.
Manderson Lehr	1st Lieut.
Kenneth Marr	Major
James A. Meissner	Major
Charles T. Menoher	Maj. Gen.
Charles I. Merrick	1st Lieut.
Paul Meyers	2nd Lieut.
Robert Moore	1st Lieut.
Leo L. Murphy	1st Lieut.
Ralph A. O'Neill	1st Lieut.
Carter Landram Ovington	1st Lieut.
David MmK. Peterson	Major
Granville Pollock	1st Lieut.
William Ponder	2d Lieut.
Charles P. Porter	2d Lieut.
Kenneth L. Porter	2d Lieut.
John A. Posey	2d Lieut.
Clifford R. Powell	1st Lieut.
David E. Putnam	1st Lieut.
Joseph C. Raible, Jr.	1st Lieut.
Rufus Randall Rand	Sergeant
Walter Davis Rheno	Captain
Edward V. Rickenbacker	Captain
Ralph Royce	Lt. Colonel
Malcolm A. Sedgwick	2d Lieut.
Morteu Seymour	Lieut.
Harry Shaffer	2d Lieut.
Reginald Sinclaire	Sergeant
Louis C. Simon, Jr.	1st Lieut.
Donald Stone	Corporal
William Thaw	Lt. Colonel
George Evans Turnure	1st Lieut.
James E. Wallace	1st Lieut.
William E. Wass	1st Lieut.
Charles Herbert Wilcox	1st Lieut.
Alan Winslow	2d Lieut.
Joseph Volney Wilson	1st Lieut.
Houston Woodward	Corporal
James Norman Hall	Captain

French Citations

Valentine J. Burger	Lieut.
Alexander T. Grier	2d Lieut.
Horace A. Lake	2d Lieut.

Italian Croce al Merito di Guerra

The following American Officers serving with

(*Continued on page* 1281)

THE AERONAUTICAL RADIATOR

By S. R. SWENSON

Head of Radiator Section, Division of Aeronautics, Bureau of Steam Engineering

Types in General

BEFORE going into the theory of design of the best radiator for use on aeroplanes, it is believed that the reader should be familiarized with the general types being made in this country as these are now being used for this purpose and will undoubtedly be in such use for some time to come; for, although they do not represent good design (except from the point of view of cheap and rapid production and automobile use) there is no radiator in production at the present time which can be turned to.

The commercial radiators fall almost entirely into the ribbon type. They are constructed from thin bronze or brass ribbons, which are in general passed through automatic stamping machines or rollers where they take on the desired form. A particularly common type is illustrated in figure one, this form of radiator being manufactured by several concerns, with very minor respective variations. Other forms are illustrated in figures two and three. These three types represent those in which there is not an excess of indirect radiating surface. There are also a number of types in which a very large percent of the total surface is not in contact with the water, this indirect radiating surface consisting in general of variously stamped metal ribbons inserted between the water-carrying assemblies. These latter types of radiators may be set aside immediately as being suitable only for automobile, truck, tractor and stationary use, because their ability to give up their heat to the air, at high air speeds does not compare favorably with other types, and their resistance to air flow (hereafter termed "head resistance") is apt to be high. They are therefore unsuitable for aeroplane work; and we may confine ourselves to a consideration of radiators which, when viewed from the front, *present clear, unobstructed air passages*, and in which *every individual vertical section is a water passage.*

Radiators of this type are constructed with approximately square air passages, whose sides vary from one quarter of an inch to three tenths of an inch, according to the manufacturer of the radiator. In many cases one concern builds them in two or more sizes of air passage, but the larger sizes should always be chosen, as the smaller do not as a rule dissipate any more heat at high speeds, and the radiators weigh more and present a higher resistance to the air.

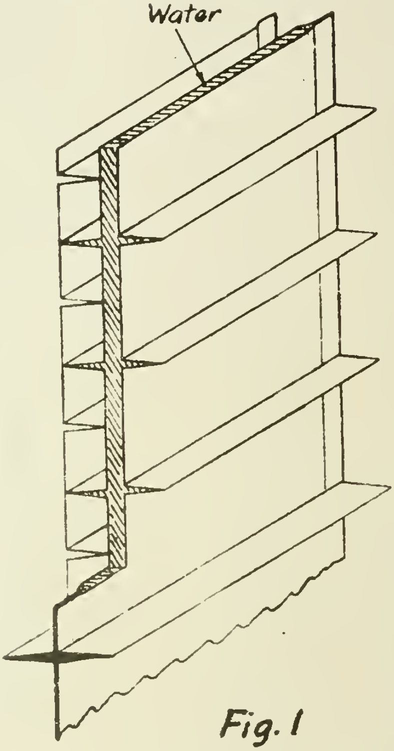


Fig. 1

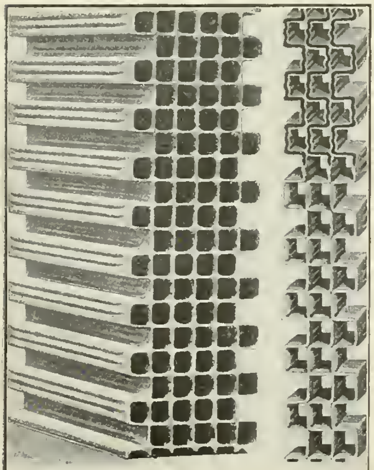


Fig. 2

Although this statement in regard to heat dissipation is not by any means evident, and is in fact entirely contradicted by the heavy curve in figure four, which covers the relation between cooling surface and the size of the air passage on a given radiator, it has nevertheless been established in wind-tunnel tests and is accounted for by the assumption that the air tends to bank up in front of very small tubes rather than flow through, so that the cooling capacity probably varies in accordance with the dotted curve of Fig. 4 rather than directly as the cooling surface. Experiments on very small air passages in this connection have not been extensive, and there is no reason, except as matters of scientific interest, why they should be; for it has been definitely proved that the resistance tends to increase at a greater rate than the cooling capacity, as the size of the air passage is reduced.

As to the thickness of the cooling section, ribbon type radiators can be obtained in various depths from two and a half inches to five inches. The thickness of the metal in the cooling section may vary anywhere from three thousandths of an inch to five thousandths; but the former thickness has been found too thin in actual use because of two things: first, its inherent weakness, and second, the fact that fine particles of dirt are often rolled into the metal, whose thinness allows this dirt to go all the way through and form leaks as soon as it works out. Metal four thousandths of an inch thick gives satisfactory results, and is therefore recommended.

The thickness of the water passages varies from fifty-five thousandths to eight hundredths of an inch, according to the maker of the radiator. Consideration of this, however, will not be taken in this article.

In addition to the types mentioned above, a type in use by the British (illustrated in Fig. 5), which presents several good points, is on the market. Its core or cooling section consists of an assemblage of round tubes with expanded hexagonal ends, which make the tubes assemblable and prevent the round portions from coming into contact, thus forming the water passages. An exceptionally sturdy construction, in which the soldered joints are all very ample and evenly distributed, this type has given great satisfaction in service. Its ability to cool, however, is not very great and its head resistance is rather high.

Having now touched upon the general types in present day use, with a few recommendations, we may turn to the methods of manufacture.

The stamping or rolling machines are practically automatic, requiring attendance only for the sake of keeping up a fresh supply of metal ribbon and removing the sections as they are cut off. Both ribbons for each small section, containing one water passage, are usually fed through at the same time, and in some cases the sides of one ribbon are cut and automatically folded over corresponding places on the other ribbon, thus locking the two together. Where this is done, individual soldering together of the two sides of each water tube is unnecessary; and no soldering is done until all the small sections are assembled into the complete cooling section.

In any case, the latter is assembled, clamped in a frame of the size and shape of the cooling section, and the whole is dipped on each side in an acid bath, and then in a shallow pool of solder, which is contained in a cast iron dipping vat.

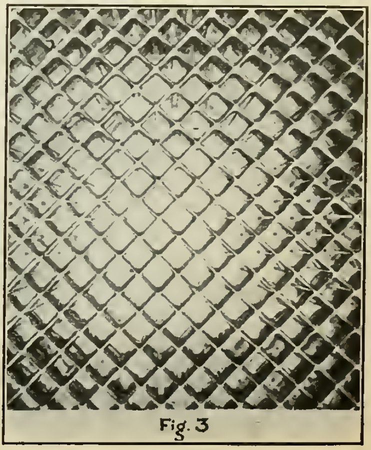


Fig. 3

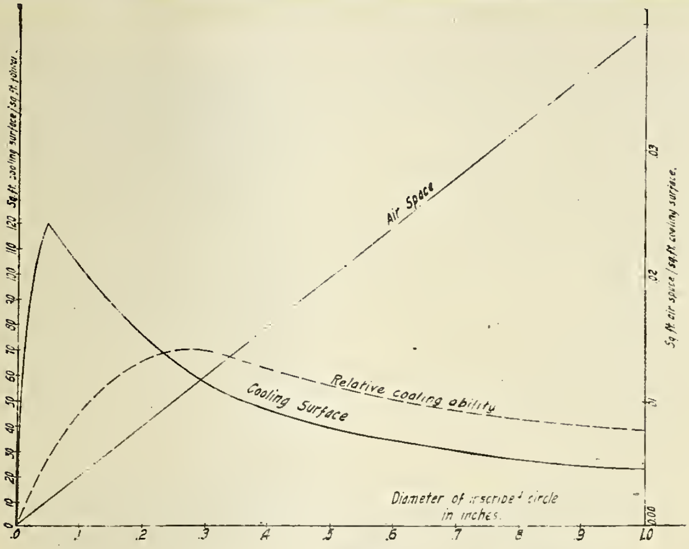


FIG.-4.

After each dip the core is lifted and shaken up and down several times in order to remove all surplus solder. It is then removed from its frame and the ends of the water passages are spread open by means of a small steel wedge. The water headers, or upper and lower tanks are now put in position and tacked on by several small beads of solder, whereupon their location is checked and they are finally soldered on.

In the case of the British or round tube type, the tubes are usually extruded and cut, whereupon the ends are bulged into the hexagonal shape; and the tubes are assembled together. From this point on the construction of the radiator follows the same routine as does the ribbon type.

Design in General

Although a good deal of theoretical discussion must go hand in hand with a full understanding of why to design a radiator for a certain aeroplane in a certain way, as much of this as possible will be set aside, and in this chapter an effort will be made to establish a few general tendencies which should be followed.

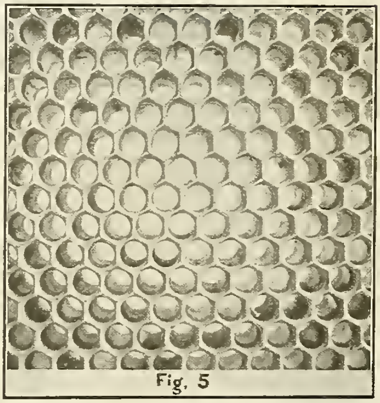


Fig. 5

Foremost of these is the admonition, DO NOT BE FOOLED BY APPEARANCES. As an example of what is meant by this recommendation, consider the nose radiator (Fig. 6). The radiator has, as far as appearances are concerned withdrawn itself from the air into the aeroplane; it does not project into the air stream; it seems to permit of an approximate streamlining of the fuselage and power plant; and it apparently adds no resistance to the machine. Quite contrary to these appearances, however, its use has added an enormous amount of head resistance and an excessive amount of weight, and has partly destroyed the streamlining of the fuselage.

A somewhat analogous case, that of the wing radiator, must be covered later.

An important principle, which should be used where possible is to enclose the engine in a streamline housing entirely, excepting such small parts as should be cooled by the air (such as exposed valve springs and stems); then put the radiator by itself in the free air stream. The reason for this is that although the engine will radiate a certain amount of its own heat if exposed to the wind, it will not do it as *efficiently as a radiator, for the latter is designed to do so and should therefore be given the whole task.

Various objections to enclosing the engine will sometimes arise in machines where it is located out between the wings, such as inaccessibility; and in the event that the engine is left entirely or mostly exposed to the air, the best location for the radiator will probably be directly in front of the engine. If the machine is a tractor, this location will expose the radiator to the high air speed of the slip-stream; but, although the radiator would be somewhat more * efficient if located outside of the slip stream, an attempt to locate it there will undoubtedly lead to very long piping and other objectionable installation troubles.

Good practice is to design the radiator in the form of a rectangle, without any tendency toward irregularities in its outline or cooling section. There is at present too great a leaning toward shaping the radiator to fit around the end of the crank case; and this tendency leads to intricate constructional work, greatly weakened radiators and, in many cases, obstructed water flow. Fig. 7, a typical nose radiator, is an excellent example of this kind of design.

Fig. 8 is a good example of a rectangular radiator, which has been designed to offer as little obstruction as possible to the pilot's view. This extreme condition of great height and small width, however, should be avoided and a condition of width slightly greater than height adhered to as closely as possible, although no very great differences in the size of the radiator required for a given job will result from

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*The use of the word "Efficient" is merely a convenience. A radiator has no true efficiency, but an analogous term, the "Figure of Merit," can be applied. It is the ratio of the power dissipated by the radiator to the power absorbed in sustaining it in flight.

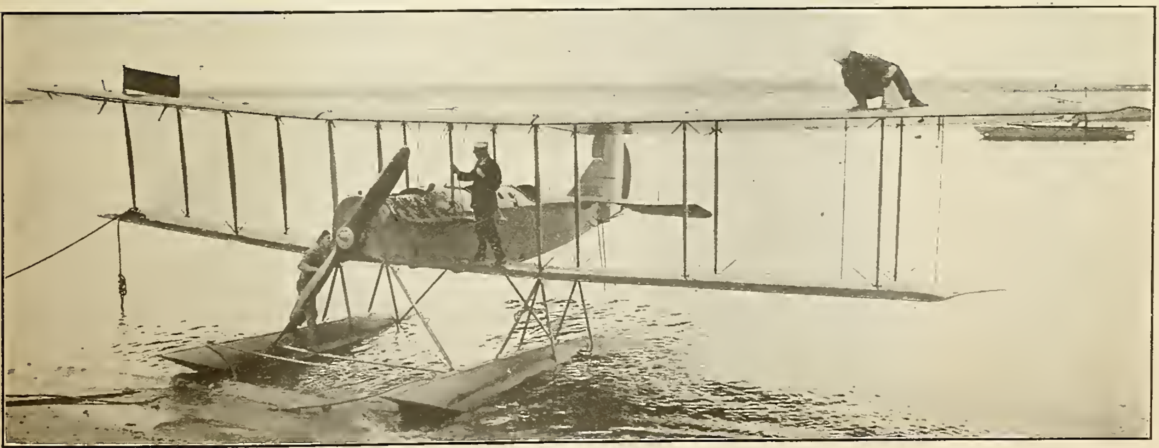


Fig. 6

different proportions. Appearance alone in this regard is a large factor.

Much trouble has been experienced in the past in estimating the size of radiator required and allowing for it in the general preliminary design of the aeroplane. But the resultant difficulties have confined themselves largely to machines designed for nose radiators; the size and shape of the cowling and nose have in many instances been determined on paper, for a radiator of a certain size, only to result in finding that a larger or smaller radiator must be installed in actual use. There has then followed, of necessity, a general redesigning of the nose and cowling in accordance with the new radiator, which in turn has to be estimated before it can be installed and tried out. With the free air radiator, however, limitations as to size and shape are much wider.

A method of design based on an empirical formula established in the wind tunnel and checked by practice is covered by Fig. 9. Naturally it cannot automatically cover all variations arising from different types of engines and conditions of installation; and it is therefore intended for use only in determining the first trial installation.

The following procedure in using this method should be followed:

Lay a straight-edge between the horsepower and the air-speed, and from the intersection of the straight-edge with the reference line project to the curve and take the reading at the top or bottom. The frontal area of the radiator is then to be taken as

$X \times K_1 \times K_2 \times K_3 \times K_4$ square inches.

Where

X = reading
K_1 = radiator constant
K_2 = radiator position constant
K_3 = engine installation constant
K_4 = engine constant

Fig. 8

and these constants are to be determined as follows:

K_1 is to be taken as .68 sq, in. if a five inch core is to be used and as .82 sq. in. if a four inch core is to be used. (For obvious reasons the constants for different makes of radiators cannot be given, but these values may be taken as applying roughly to the types previously described and recommended.)

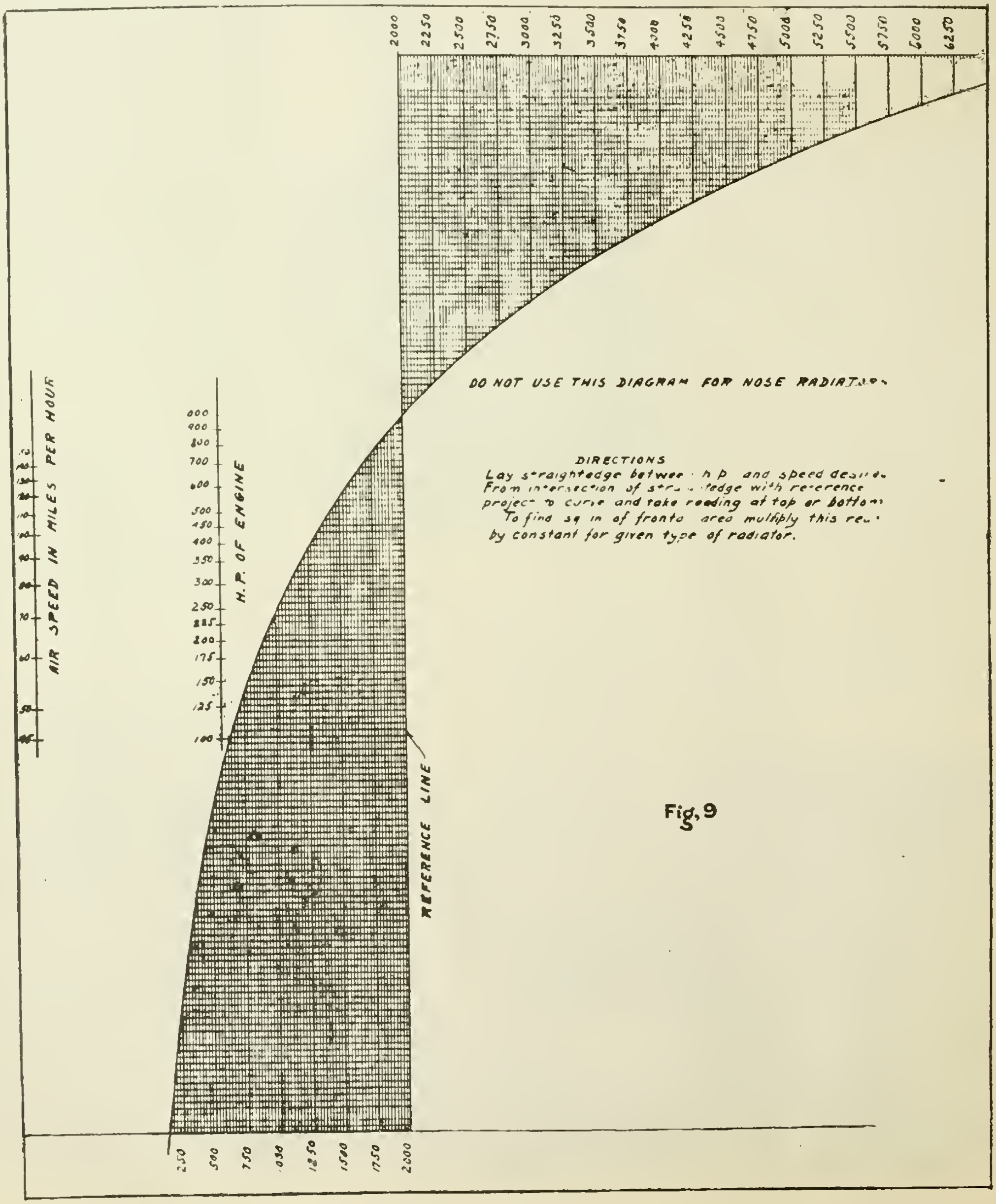


Fig. 9

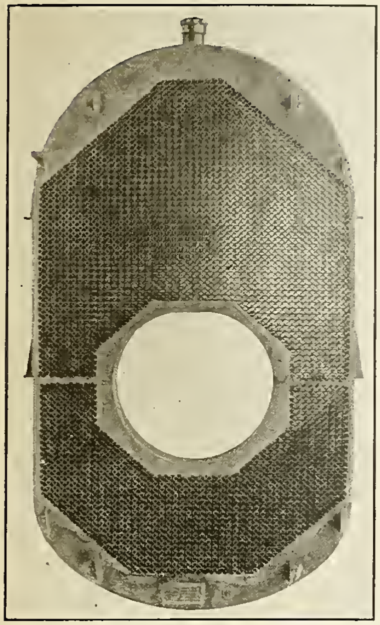


Fig. 7

$K_2 = 1$ if the radiator is to be placed in front of the engine, but should be taken as .9 if the radiator has no obstruction behind.

$K_3 = 1.00$ if engine is exposed

$K_3 = 1.05$ if engine is exposed, but has monoblock cylinder assemblies.

$K_3 = 1.10$ if engine is to be housed in and

$$K_4 = \frac{Q}{P} \times .0284.$$

Where Q = B.t.u. per minute removed by jacket water in laboratory test

P = Corresponding brake horsepower of engine.

If information leading to the determination is not available, K_4 is to be taken as unity.

Then, having determined upon the trial size, install it in the machine, and determine the following in best climb:

Radiator inlet temperature = T_i
Radiator outlet temperature = T_o
Air temperature = T_d

Then, where

S = correct size of radiator
s = size used in trial
D = desired difference in degrees between air temperature and radiator inlet temperature (usually about 100).

$$S = s\frac{T_i + T_o - 2T_d}{2D - T_i + T_o}$$

The derivation of this formula will be covered in a later chapter.

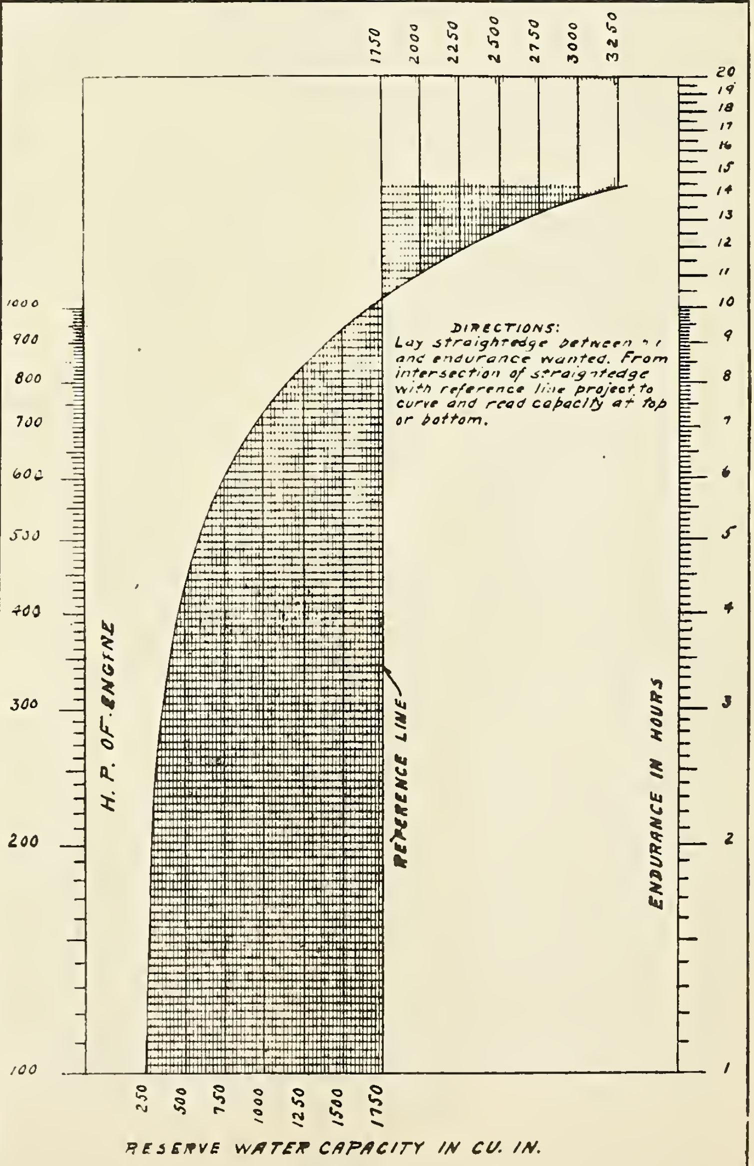
If for any reason the trial radiator is so small that the water temperature reaches the boiling point, the test will be practically valueless unles the amount of steam forced is very small indeed. The formation of steam and its rejection into the air will do away with a great deal of heat, which, of course, would be automatically credited to the radiator in the calculations.

For flying boats and seaplanes intended for training purposes, where a great deal of taxi-ing is done, the size of the radiator should be increased by twelve percent above that determined from the diagram, and the value of "D" should be taken as 90 instead of 100.

In medium size radiators—in the neighborhood of three or four hundred square inches of frontal area—the addition of a small projecting lip extending around the cooling sections may reduce the required size of the radiator by as much as eight percent, but its addition is not recommended unless a special effort must be made to reduce weight or size, as an increase in head resistance which more than offsets the saving in weight is entailed in its use. On small, very narrow radiators, designed to offer little obstruction to view, however, it should be brought into use, as the tendency for the air to slip off the face is very great.

An increase in the heat dissipation and a consequent decrease in the size of radiator required can also be obtained by turning the radiator out of its normal position, the maximum increase in cooling, about twenty percent, coming at about thirty-three degrees away from the normal; but the increase in resistance is so great that this procedure is in no case recommended.

We may now turn to the design of the upper water tank, and in so doing immediately have to determine its exact function. Is it intended merely as a distributor, or should it be a reserve water tank, containing enough water to allow for evaporation? Several considerations affect the answer to this question; but, undoubtedly, on small machines where complication is to be avoided and which are not intended for long flights, the upper tank should serve both as a distributor and as a carrier of reserve water. On large machines intended for flights of very long duration, it should act simply as a distributor or header, and the reserve water



DIRECTIONS:
Lay straightedge between [illegible] and endurance wanted. From intersection of straightedge with reference line project to curve and read capacity at top or bottom.

Fig, 10

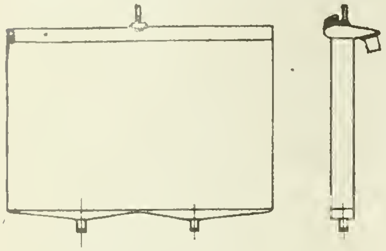


Fig. 11

should be removed from the wind and placed elsewhere.

In either case, it is needless to say that the upper tank or header should be streamlined as well as possible.

Fig. 10 covers a method of determining the amount of reserve water, and is based on the British formula:

$$\text{Gallons} = \frac{\text{h.p. x (endurance in hours)}}{1600}$$

which is entirely empirical and is not believed to be final by any means. Its use, however, has given entirely satisfactory results.

There are various opinions concerning the location of the separate reserve water tank, one of these being that it should be carried below the engines and operated by a hand pump. The fallacial reason for this opinion is that if the cooling system leaks the reserve water will not run out. But the absurdity is only too apparent when it is remembered that it will be necessary to pump in the reserve water as soon as a leak occurs. It does not seem feasible to make provision against leakage, as no limit to the amount of extra water can be determined.

An excellent place for the reserve water tank is in the wing, but this location should not be adopted on a machine which is apt to encounter freezing temperatures at a time of the year when it is not desired to carry a non-freezing solution.

The lower header should act entirely as a collector; and should therefore be made as small as possible and on the general lines of that shown in Fig. 11.

Before turning entirely from the consideration of the size of the radiator, a special case must be brought to mind—that of the twin-engined dirigible. This type of craft is very often purposely flown with only one of its two engines in operation; and if the cooling systems are entirely separate, each radiator must of necessity be large enough to cool one engine operating alone; and it should be designed for the speed at which the ship will fly when only one engine is in operation, and should be tested under these conditions. But an especially good installation (Fig. 12) which obviates the use of these larger radiators can be made if the cooling systems of the two engines can be so arranged as to be connected in series at will (assuming that the water pump of each engine is of such a construction as will allow water to pass when it is idle). The radiator of the engine which is not in use is thus made available for furnishing the additional cooling required by the engine which is in operation; the idle engine is kept warm, and in the case of very cold weather the water in the cooling system of the idle engine is kept from freezing. In connection with such an installation, the importance of using shutters or of making the radiators retractable cannot be overestimated.

A Consideration of D

In order to establish the formula $S = s \text{ x } \frac{T_1 + T_o - 2T_d}{2D - T_1 + T_o}$ a consideration of what it is based on must be made. It need not be stated that the heat dissipated by a radiator is proportional to the difference between the average radiator temperature and the average air temperature, the former being the mean value of the inlet and outlet water temperatures, and the latter being the mean value of the entering and leaving air temperatures. The temperature of the leaving air, however, may be set aside from consideration for practical purposes because of the general difficulty of determining it, and because the error involved in leaving it out is smaller by far than the probable errors involved in taking the remaining readings. Then, for practical purposes we may take the cooling power of the radiator as being proportional to the difference between the mean radiator temperature and the air temperature; and this difference will hereafter be called the *mean difference.*

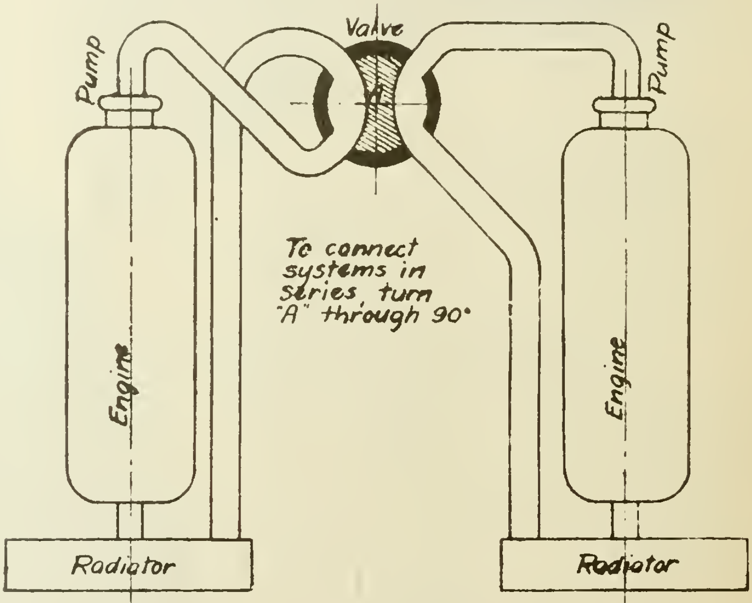


Fig. 12

Now consider a radiator, of size s, which has been tested in flight, the following conditions having prevailed during this test:

T_1 = radiator inlet temperature
T_o = radiator outlet temperature
T_d = air temperature

Now let m = the mean difference

$$m = \frac{T_1 + T_o}{2} - T_d$$

Now suppose T_1 proved the radiator to be of incorrect size, and it is desired to find the correct size. To do this let

T'_1 = New inlet temperature
T'_o = New outlet temperature
m' = New mean difference
D = Desired $T'_1 - T_a$
S = New size.

Then

$$S = s\frac{m}{m'}$$

$$m' = \frac{T'_1 + {}_1T'_o}{2} - T_a$$

$$D = T'_1 - T_a$$

$$T'_1 = D' + T_a$$

$$T'_o = T_1 - (T_1 - T_o)$$

$$= D + T_a - T_1 + T_o$$

and

$$m' = \frac{D + T_a + D + T_a - T_1 + T_o}{2} - T_a$$

$$= \frac{2D - T_1 + T_o}{2}$$

$$\text{Therefore } \frac{m}{m'} = \frac{\frac{T_1 + T_o - 2T_a}{2}}{\frac{2D - T_1 + T_o}{2}}$$

$$= \frac{T_1 + T_o - 2T_a}{2D - T_1 + T_o}$$

and S

$$= s \text{ x } \frac{T_1 + T_o - 2T_a}{2D - T_1 + T_o}$$

Having now established this formula, some consideration should be given to the assigning of values to D; and in so doing it should be borne in mind that although

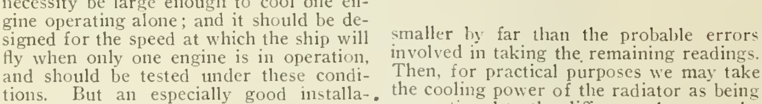


Fig. 15

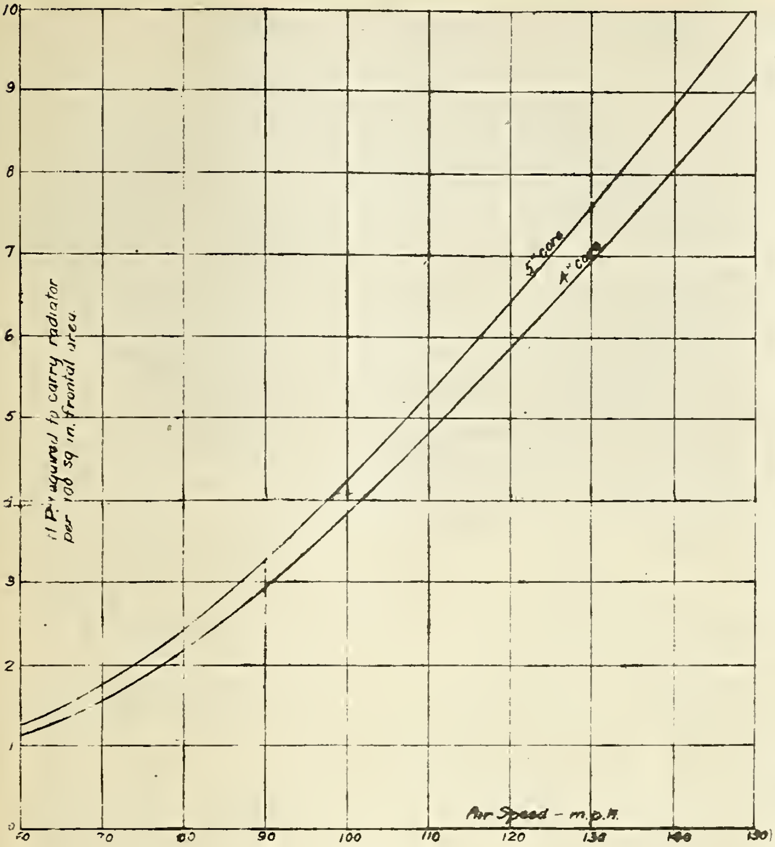


Fig. 14

the size of the radiator does not vary directly as the air temperature (but varies inversely as the mean difference), the temperature of the water in any given installation does very directly as the air temperature. Thus an increase of x degrees in the temperature of the air will give an increase of x degrees in the temperature of the water.

Therefore, to D should be assigned such a value as will not allow the water temperature to go above a desired maximum in best climb at the highest air temperature to be encountered.

A consideration of the effects of altitude on water temperatures in this connection is furthermore necessary; and the following may be taken, in general, as being very nearly true: The density of the air decreases with altitude, the power of the engine varies as the density of the air, but the cooling power of the radiator also varies as the density of the air. Therefore, the only consideration affecting the water temperature, or size of radiator required, is the air temperature (assuming that the percentage of throttle opening on the engine does not change).

The value of D should be based on the average highest air temperature at the ground which will be encountered, and it will be fair to assign a value of one hundred and ninety degrees to the highest desired water temperature. Thus, assuming the average highest air temperature to be ninety degrees D will have a value of one hundred. But although D, in this case, is to be based on the ground temperature, *in all tests the air temperature should be taken* in flight, as it cannot be counted upon as varying in any definite way with altitude. And in all cases the engine should be thoroughly warmed up before taking off.

In the special case of a machine which is to make certain definite trips (such as mail carrying), and can make these in general at an altitude above 5,000 feet, it will be quite possible to assign a value to D as high as one hundred and fifteen.

There is another element which affects the size of the radiator to be used and the value of D, and that is the fact that certain types of engines, due to inherent defects in design, develop more power at lower temperatures than others. If it is noted from the power curve of the engine that it will develop more power at a low temperature, it will, of course, be necessary to determine whether the accompanying increase in size of the radiator will or will not offset the actual gain in the power of the engine. In order to facilitate decisions in this regard the following table, giving a good average relation between values of D and the size of the radiator (given in percent of that *determined from the chart, Fig. 9) is given:

D	Size in percent of that *determined by the chart, Fig. 9.
100	: 100
90	: 112
80	: 127
70	: 148
60	: 175
50	: 216

Fig. 13.

In connection with this table the curves, Fig. 14, are intended for use, and may be considered to give fair values of the power required to carry the radiator. Thus, if it is found that by operating the engine at a hundred and sixty degrees instead of at a hundred and ninety degrees, the power will be increased by x horsepower, we assign D a value of 70 and find that the size of the radiator will increase forty-eight percent. We determine from the design chart, Fig. 9, how many square inches of frontal area are entailed by this additional forty-eight percent and refer them to Fig. 14. We then find that an additional y horsepower will be required to carry the radiator, and a direct comparison between x and y can be made.

It is to be noted, however, that if the machine will probably operate at great altitudes there will be no objection to giving D its usual value, as most of the flying is to be done at a considerably lower temperature than that obtaining at the ground and the engine will probably be running at the desired low temperature. In this connection a drop in temperature of 3½ degrees per thousand feet may be expected, but this should never be counted upon in assigning a value of more than a hundred and fifteen to D, as there will probably be many instances where the air temperature will vary irregularly with altitude.

The Fallacy of the Nose Radiator

Practice is slowly abandoning the nose radiator, but all too slowly; and it is believed that in many cases the abandonment has been made solely because of its excess weight and cumbersome construction, with considerable doubt still existing as to whether, taking everything into consideration, it should really and finally become a thing of the past or not. Undoubtedly, it makes a very neat installation, becoming an integral part of the fuselage, as far as appearances are concerned and apparently offering no additional head resistance to the aeroplane. So there are still its advocates.

The argument that a radiator operating in a slow air flow does its work with a smaller amount of energy being spent on it is often brought forward in its favor; and is quite correct as applied to the nose radiator by itself. It does operate in a slow air flow, and is undoubtedly efficient by itself. But the argument should not confine itself to the radiator alone, but to the conditions resultant from its installation, for the air speed is slow because of the enormous amount of resistance which it encounters behind the radiator—in swirling around the engine, pipes, wires and braces, and in finally finding its way out through some opening which is entirely too small. Furthermore, allowing the air to flow into the nose of the machine destroys the effectiveness of its streamlining. The result is that the head resistance due to the radiator is very much greater when the radiator is in the nose than it would be if the radiator were out in the free air stream; and because of the small amount of air flowing through it, it has to be unusually large and heavy.

It has been found that when the nose radiator is partly covered the speed of the machine will increase. This fact, and the instance of a British machine from which the nose radiator was removed, are excellent practical examples of the case against this kind of an installation.

On the machine in question an increase of fourteen percent in rate of climb at

(*Continued on page* 1286)

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* The size "determined from the chart" is to be taken as the reading taken on the chart plus times the four constants.

NAPIER "LION" IN AERO ENGINE

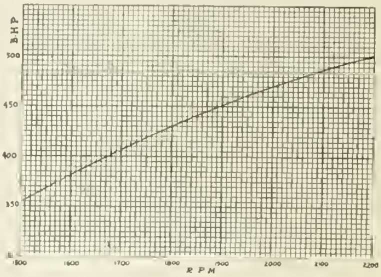
By G. DOUGLAS WARDROP, M. S. A. E., A. S. M. E.

THE Napier "Lion" 12-cylinder aero engine, manufactured by D. Napier & Sons, Ltd., of England, attracted international interest recently because of the unofficial record which it enabled Capt. Lang of the British Air Force to make when he reached an altitude of 30,500 feet.

The engine has 12 cylinders arranged in three blocks of four cylinders, the angle between each block being 60°. The cylinder bore is 5½" and the stroke 5⅛".

The Cylinders are made from steel forgings and are machined all over. The four cylinders in each block are secured to the crankcase by studs and nuts and to an aluminum head casting which contains the inlet and exhaust passages and the valves and valve mechanism. The cylinders are fitted with steel water jackets and two ignition plugs. There are two inlet and two exhaust valves in each cylinder. The valves are each fitted with two coil springs and a special friction locked tappet head and are operated direct by two camshafts which are carried in gunmetal bearings mounted on the head casting of each block. The camshafts are driven through bevel gearing by vertical shafts from the crankshaft at the rear end of the engine.

The Crankcase is an aluminum casting and is carried in the fuselage by six arms, three on either side. The front end encloses the propeller drive reduction gear and carries the airscrew shaft cover, airscrew shaft and bearing. The casting for the camshaft water and oil pumps and magneto drives is bolted to the rear end of the crankcase. The roller and plain bearings of the crankshaft are carried on the cross walls of the casting and are fitted with steel caps and studs. A large breather is mounted on the reduction gear casing.



Brake H.P. curve of the Napier "Lion" aero engine

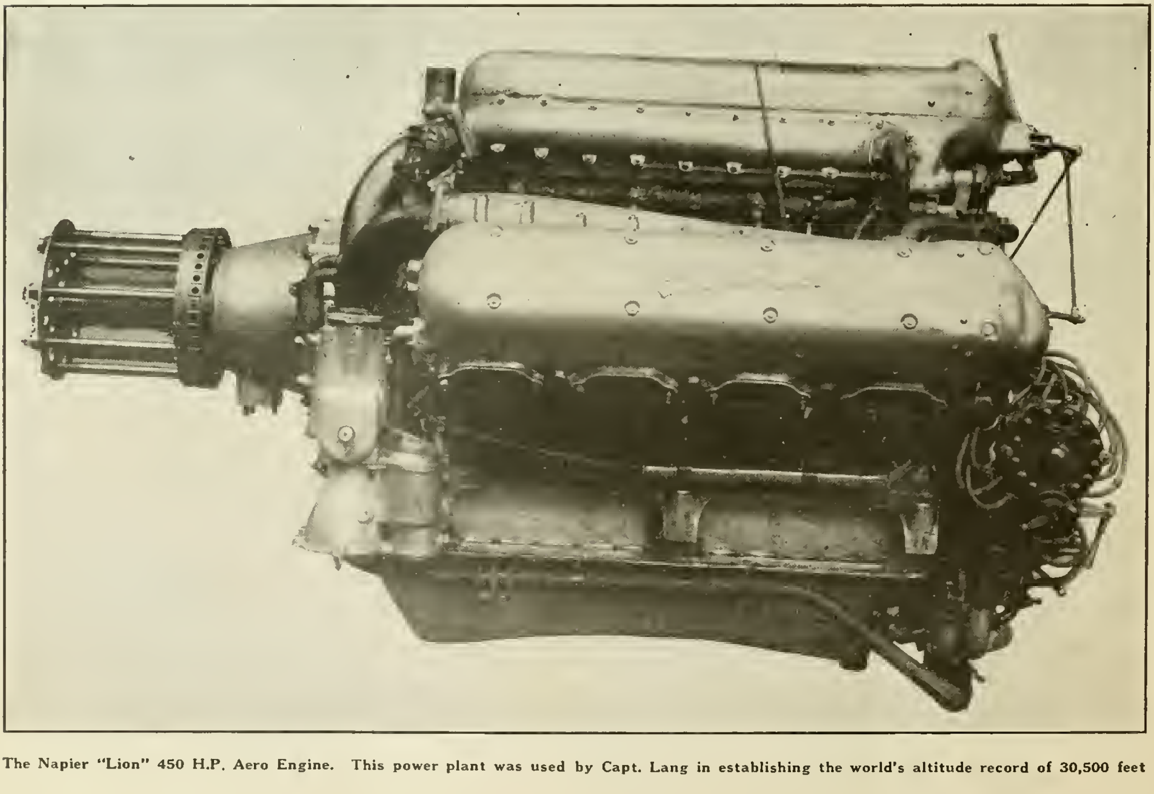
The Oil Sump of pressed aluminum, to which a stiffening plate is riveted, is bolted to the bottom flange of the crankcase. The sides and ends slope inwards and the bottom downwards from the middle towards the ends. Two steel suction pipes are fitted inside the sump, one leading to either end and connected to the suction oil pumps. The steel oil pipe carrying oil to the front end of the crankshaft also passes through inside the pump.

The Crankshaft is very rigid and is machined from a solid steel forging. It has four throws all in one plane. The crankpin and journals which are of large diameter are bored out and fitted with end plates held in position by bolts passing through the holes in the shaft. Holes are drilled in the webs connecting the pins and journals to the ends of the shaft. The shaft is carried in five substantial roller bearings and one plain bearing at the front end. The crankshaft reduction gear is fitted at the front end of the shaft and is carried on a taper and two keys and held in position by a nut.

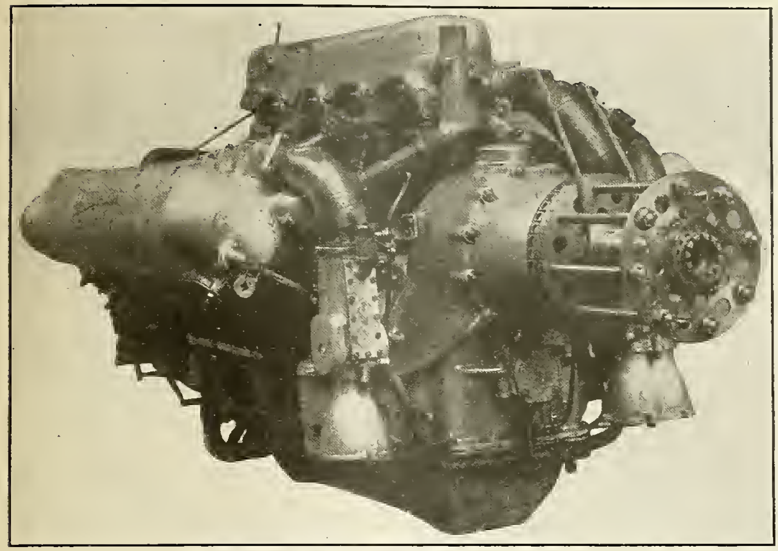
The Airscrew Shaft, which rotates in a clockwise direction, is carried on two roller bearings and is fitted with a large double thrust ball bearing which permits of the engine being used on either pusher or tractor machines. The reduction gear wheel of spur tooth type, is bolted and spigotted on to a flange solid with the shaft. The airscrew shaft and gear can be withdrawn from the crankcase complete with the cover. The reduction between the crank and airscrew shaft is 1.52 to 1. The propeller boss is made to Air Board Standard No. 4.

The Pistons are of aluminum alloy with large diameter hollow gudgeon pins fitted into steel bushes cast integral with the piston. There are two gas and two scraper rings.

The Connecting Rods are machined from high grade steel stampings. The big end of the master rod—which is



The Napier "Lion" 450 H.P. Aero Engine. This power plant was used by Capt. Lang in establishing the world's altitude record of 30,500 feet



Propeller end of the Napier 450 H.P. aero engine

coupled to the pistons on the vertical block of cylinders—is lined with white metal. There are four lugs on the master rod, two on either side, for the two short auxiliary rods. The gudgeon pin ends of all the rods and the anchor pin ends of the auxiliary rods are bushed. Pipes for carrying oil to the gudgeon pins are fitted. All the working surfaces are pressure lubricated.

Auxiliary Drives. The magnetos, water and oil pumps are driven through bevels mounted on a short auxiliary shaft carried on the rear end cover. The front end of the shaft engages in slots on the crankshaft and is driven at crankshaft speed.

The Water Pump is mounted vertically under the rear end cover and runs at engine speed. The pump delivers water through three outlets to the rear end of the jacket on each cylinder block. A white metal packed stuffing box and greaser is fitted.

Oil Pumps. There are two suction and one pressure spur gear type oil pumps fitted at the rear end of the cover casting. The suction pumps are connected to the ends of the oil sump. The pressure pump delivers oil from the supply tank to both ends of the crankshaft. All the pumps run at half engine speed and are driven through bevels and spiral gears from the auxiliary shaft. The capacity of either suction pump is greater than that of the pressure pump. An oil filler is fitted between the pressure pump and the supply tank.

Magnetos and Ignition. The two special 12-cylinder dual ignition magnetos (B. T. H. AV12, L & S) are mounted on transverse platforms on the rear end cover and are secured by set screws. The magnetos rotate anti-clockwise and are driven at two-thirds engine speed through bevels from the auxiliary shaft. They are fitted with special rotors to facilitate starting up by hand; the advance and retard levers are interconnected through links and bell crank levers mounted on the rear end cover. The ignition cables are carried in tubes mounted on the crankcase.

A Tachometer Drive is mounted on the casting carrying the drive shaft for the vertical cylinders, rotates at one-quarter engine speed and is fitted with a standard Air Board end connection.

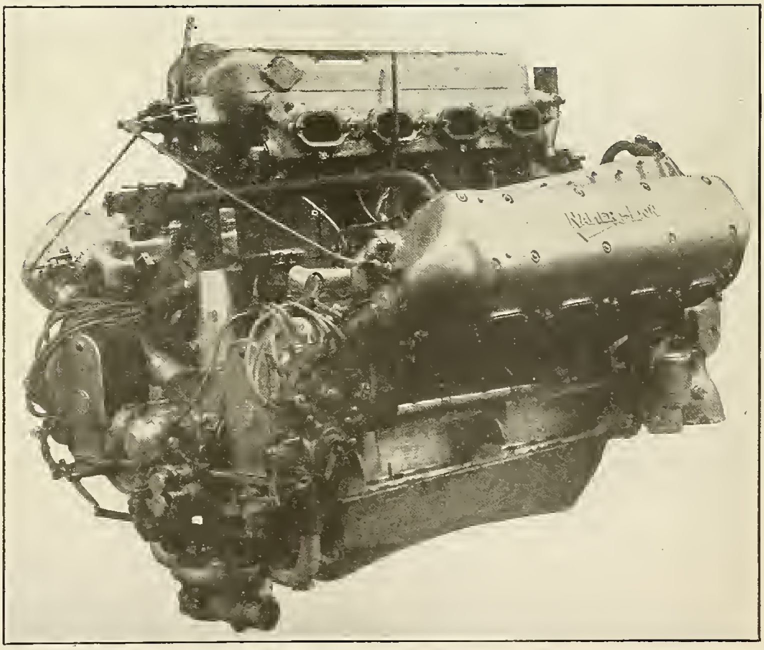
Carburcters. One double (N. D.) and one single (N. S.) carbureter is fitted on the engine. The double carbureter is mounted on the L. H. side and supplies the L. H. and vertical cylinder blocks. The single carbureter is mounted on and supplies the R. H. block. They are connected through water jacketted steel pipes to the induction manifold on the cylinder head castings. The carbureter bodies are of aluminum in two halves and are water jacketted. Both carbureters are fitted with altitude control cocks which are interconnected through levers to the throttle levers at the pilot's cockpit. The carbureter control shafts are carried in brackets on the crankcase. The carbureters are stayed to the crankcase to prevent vibration. Under running conditions the pipes and cock fitted at the rear ends of the induction manifolds act as an equalizing system for the three cylinder blocks.

Lubrication. All the connecting rod big ends, gudgeon pins and crankshaft plain bearing are pressure lubricated. Branch pipes from the pressure pump convey oil under pressure to the camshafts and bearings. The oil escaping from the ends of the bearings lubricates the valve tappets and is drained away at the ends of the head casting into the sump and returned by the suction pumps to the supply tank. The reduction gears are lubricated by oil squirted on to the teeth through a pipe connected to the crankshaft oil system. An adjustable leak pressure relief valve and a pressure gauge connection are fitted in the pressure system.

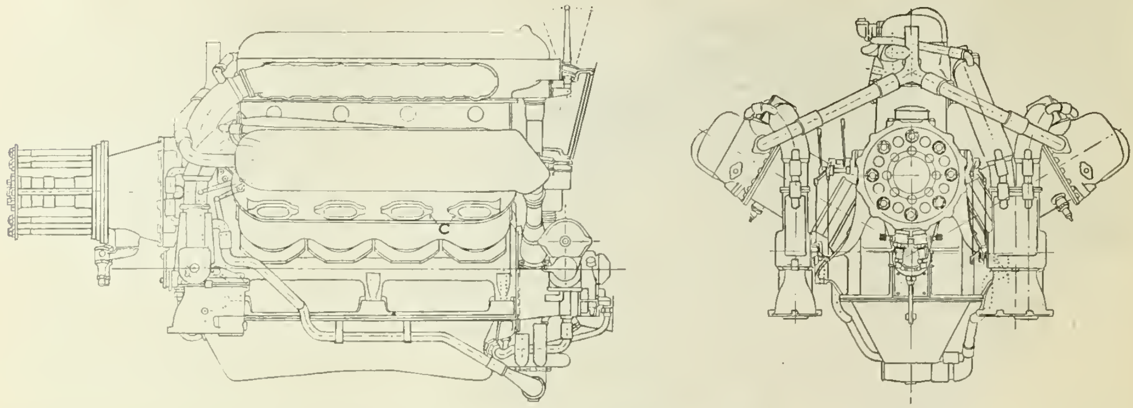
Gas Starter. The engine is started by pumping an explosive air petrol gas mixture into the cylinders; the mixture is then ignited by means of a hand starting magneto operating through the special rotors on the engine magnetos. The gas starter comprises a hand operated air pump, petrol vaporizer, a distributing or equalizing cock with pipes, and a system of levers mounted on the cylinder head castings for opening the valves by hand.

The engine, complete with propeller boss, carbureters, induction pipes, etc., weighs 850 lbs. approx:

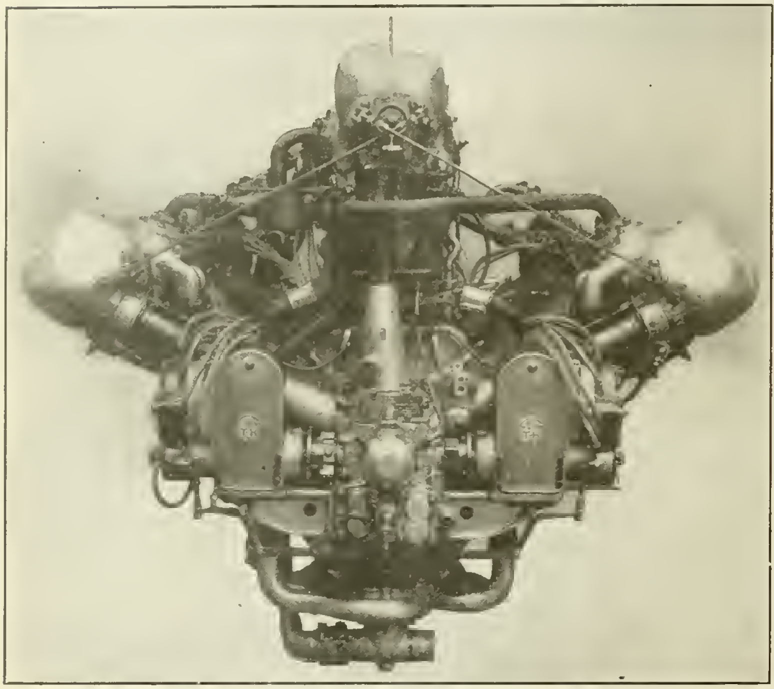
Horsepower 450 at 1,925 r.p.m.



Anti-propeller end of the Napier 450 H.P. aero engine, showing special arrangement of the cylinders



Side view and end diagram of the Napier "Lion" 450 H.P. aero engine



Anti-propeller end view of the Napier "Lion" 450 H.P. aero engine, showing the two special 12-cylinder B. T. H. Magnetos

Cited for Distinguished Service

First Lieut. John R. Castleman, Air Service pilot, 99th Aero Squadron. For extraordinary heroism in action near Romagne, France, October 5, 1918. In spite of being attacked by seven enemy planes, type Fokker, and later by five, type Pfalz, Lieut. Castleman successfully accomplished a photographic mission 6 kilometers behind the German lines, without protection, and also destroyed two of the enemy planes. Home address, F. I. Castleman, brother, 128 Rochelle Avenue, Wissahickon, Philadelphia, Pa.

First Lieut. John Y. Stokes, Jr., Air Service, 20th Aero Squadron. For extraordinary heroism in action near Etain, France, September 16, 1918. After their own formation had been broken up, Lieut. Stokes and his pilot voluntarily continued on their bombing mission with planes from another squadron. Although their plane was thrown out of control by antiaircraft fire, they proceeded to their objective and dropped their bombs. Their motor then died completely, and they were attacked by an enemy combat plane, but they fought off the attacking machine and reached the allied lines, where their plane crashed in a forest. Home address, John Y. Stokes, father, West Market, Reedsville, N. C.

Second Lieut. Edw. M. Morris, pilot (Air Service). For extraordinary heroism in action near Landres-et-St. Georges, France, October 30, 1918. Unable to complete a photographic mission, owing to motor trouble, Lieut. Morris, with his observer, made a reconnaissance behind the German lines. They dispersed a battalion of enemy troops, and although twice attacked by enemy patrols, drove them off and each case brought down one enemy plane. They remained in the air until their motor failed completely. Home address, Mrs. Rose Morris, 109 West One Hundred and Twenty-ninth Street, New York, N. Y.

First Lieut. Flynn L. A. Andrew, observer (Air Service). For extraordinary heroism in action near Landres-et-St. Georges, France, October 30, 1918. Unable to complete a photographic mission, owing to motor trouble, Lieut. Andrew, with his pilot, made a reconnaissance behind the German lines. They dispersed a battalion of enemy troops, and although twice attacked by enemy patrols, drove them off and in each case brought down one enemy plane. They remained in the air until their motor failed completely. Home address, Mr. Wm. H. Andrew, 1441 Pennsylvania Avenue, Denver, Colo.

Capt. Clearton H. Reynolds, pilot (Air Service). For extraordinary heroism in action near Romagne, France, October 9, 1918. Although weather conditions made flying exceedingly dangerous, Capt. Reynolds, with his observer, started on a mission to determine the position of the front-line troops of the division to which his squadron was attached. Flying at an altitude of 20 meters, they encountered and defeated three enemy patrols, gathered and deliverd to division headquarters very valuable information. Home address, Mrs. Lena B. Reynolds, mother, 33 North Seventeenth Street, East Orange, N. J.

First Lieut. Britton Polley, observer (Air Service). For extraordinary heroism in action near Romagne, France, October 9, 1918. Lieut. Polley was assigned to a mission to find line troops of the division to which his squadron was attached. Weather conditions made flying almost impossible, a second plane, assigned to the mission returning on that account. Flying at an altitude of 25 meters over enemy lines, he encountered and defeated three enmy patrols, gathring and delivring to his division headquarters, most valuable information. Home address, J. W. E. Polley, father, 440 East One Hundred and Sixty-sixth Street, New York, N. Y.

Second Lieut. Frank Luke, Jr., deceased, Air Service, 27th Aero Squadron. For the following act of extraordinary heroism in action near Etain, France, September 18, 1918, Lieut. Luke is awarded a bar to be worn with the distinguished-service cross awarded him November 8, 1918. Immediately after destroying two enemy observation balloons, Lieut. Luke was attacked by a large formation of German planes, Fokker type. He turned to attack two, which were directly behind him, and shot them down. Sighting an enemy biplane, although his gasoline was nearly gone, he attacked and destroyed this machine also. Next of kin, Frank Luke, 2200 West Monroe Street, Phoenix, Ariz.

Hon. Albert S. Burleson, Postmaster General
Hon. Otto Praeger, Second Assistant Postmaster General
J. B. Corridon, Superintendent, Division of Aerial Mail Service

Louis T. Bussler, Chief of Maintenance and Equipment
J. Clark Edgerton, Chief of Flying Operations
George L. Conner, Chief Clerk, Division of Aerial Mail Service

PILOTS

Ira O. Biffle
Dana C. DeHart
Edward V. Gardner
Lawton V. Smith
Leon D. Smith
Robert F. Shank
Irving Graeh

John A. Jordan, Superintendent, Western Division
Trent C. Fry, Manager, Belmont Park, L. I.
Charles I. Stanton, Manager, College Park, Md.
John M. Miller, Manager, Bustleton, Pa.
O. J. Sproul, Manager, Chicago, Ill.
C. E. McMillan, Manager, Cleveland, Ohio
August Carlson, Manager, Lehighton, Pa.
Harry F. Powers, Manager, Bellefonte, Pa.
William Lindley, Manager, Clarion, Pa.
J. P. Edwards, Manager, Bryan, Ohio
Charles N. Kight, Special Representative

RESERVE PILOTS

Lester F. Bishop
Dan Davison
C. C. Eversole
E. A. Johnson
D. I. Lamb
Frank McCusker
E. H. Lee
Lyman Doty

CHIEF MECHANICS

Frank Tower
Edward C. Radel
Chas. C. King
H. E. Fremming
Albert Cryder

Post Office Department Asks for Bids to Modify D. H. 4's

The Post Office Department has advertised for bids for the reconstruction and modification of the DeHaviland aeroplanes turned over to the Postal Service by the War Department. Sealed proposals for this work will be opened on February 26 at the Department in Washington.

The bids requested call for changing and modifying 12 DeHaviland 4 aeroplanes, and as many more up to 60, in lots of 12, as the Postmaster-General may direct. The changes to be made may be determined by inspecting a sample plane at the mail aviation field at Belmont Park, Queens, Long Island, New York, which may be surveyed and compared with the D. H. 4 battle planes, a specimen of which may also be found at the aviation field.

The changes comprehend the following, and such other changes as may be shown in said remodeled D. H. 4 plane at Belmont Park aviation field:

1. Pilot cockpit to be moved to rear.
2. Longerons on fuselage to be reinforced with 1/32" steel channels from front engine plate to rear of pilot's cockpit.
3. Longeron splices to be reinforced with steel plates.
4. Upper engine section wire to be increased in size and fittings reinforced with metal straps running diagonally from upper to lower longerons.
5. 1/32" steel reinforcing strip to be replaced on sides of fuselage from lower reinforcing strip to center sections fore and aft wires.
6. Bulkheads to be reinforced with cross bracing.
7. Mail compartment to be finished with 3/16" three-ply veneer and suitable covers and straps.
8. Turtleback to be better streamlined from rear of pilot's cockpit to stabilizer.
9. New cowling to be provided from engine to rear stabilizer.
10. All outer struts to be pinned with bolts.
11. To be fitted with stronger landing gear and same placed forward of old position, as per sample plane.
12. Bracing wires to be installed on elevators and rudders.
13. Stabilizer under brace to be tightened with bolts instead of pins.
14. Fitting at front lower longeron to be strengthened to take load of upper drift wire off wood by making fitting to go around longeron.
15. Rudder to be so arranged as to give plenty leg room.
16. Two pressure gasoline tanks and gravity tank totaling 180 gallons to be installed.
17. Instrument board to be placed as in sample D. H. 4 now at Belmont Park.

Delivery: The time for delivery of work should not be longer than four weeks from date of award for six of the machines, the second lot of six to be delivered within two weeks thereafter.

The Department will deliver the ships to and from factory.

Air Mail for Honduras

New Orleans.—Aeroplane mail service between Honduras, Nicaragua, Salvador and the United States is soon to be established, according to Joaquin Bonilla, Honduras counsel to Manchester, England, who has arrived in New Orleans from Honduras.

Mr. Bonilla said details are now being worked out and it was expected the service would be in operation within the next few months with Tegucigalpa as the main base. Mr. Bonilla is a son of Manuel Bonilla, former President of Honduras.

American Aces Tell Exploits In Washington

Washington, D. C.—Three American aces, Captain "Eddie" Rickenhacker with twenty-six planes credited to him, Lieut. J. O. Donaldson, credited with nine victories, and Captain Douglas Campbell, with seven victories, were the guests of the National Press Club on the night of February 13. Each of the aviators made addresses recounting some of their experiences in France. The story of Lieut. Donaldson, who is a resident of Washington, was the first account of his adventures given in public. Donaldson was captured by the enemy, but succeeded in eluding his captors and making his way with a companion to a German aerodrome. An effort was made to reach the allied lines by aeroplane, and after three hours of "tuning up" in the darkness of a hangar a German officer interrupted them. However, the two aviators made their way to the woods, where they were captured and placed in solitary confinement. A second attempt, this time successful, was made several weeks later, Donaldson being accompanied by four other officers.

Victor Chapman Extolled In Music

New York, N. Y.—The Society of the Friends of Music gave a concert at Aeolian Hall on February 15 in memory of Victor Chapman, one of the first American aviators to give his life for the cause of democracy. The composition rendered was written for the occasion by Charles Martin Loeffler.

Dirigible Endurance Record Broken

Cape May, N. J.—Remaining aloft for 33 hours and 6 minutes under the most unfavorable weather conditions, the naval dirigible C-3 last week established what is claimed to be a world's endurance record for the non-rigid type of balloon.

The C-3, with Ensign Clarence W. Tyndall of New York in command, left its hangar at the naval air station here last Wednesday at 4.35 P. M. Bad weather set in a few hours later and during the cruise up and down the coast rain; high winds, snow and extremely low temperatures were encountered. Early Friday the dirigible developed motor trouble, and at 1.41 o'clock that morning a safe landing was made on the flying field at Cape May.

The C-3 is of the blimp type developed during the war by the British Royal Flying Corps, and is the largest dirigible balloon in the navy's service. Ensign Tyndall was accompanied by two pilots, a radio operator and two mechanicians.

In its first endurance cruise about three weeks ago the C-3 remained aloft for twenty-seven hours and covered a distance of more than 1,000 miles.

Four French Air Mail Lines in Operation

Paris.—The fourth civilian postal air line in France will be in operation soon between Paris and Nice with landings at Lyons and Marseilles, according to the New York *Globe*. The most recently established service, that between Paris and Lille, is more than four times faster than the present train service, taking one hour and forty minutes instead of eight hours, while the two hours and a quarter mail service between Paris and Brussels is proving a great time saver, railway trains sometimes requiring twenty hours for the trip.

The Paris-St. Nazaire line, which has been in operation since August 17 on an average of eighteen days out of every thirty, is expected, as is the case of other services, to run about 80 per cent. of the time with better weather conditions in March and 90 per cent. or better in April and the succeeding summer months.

Mrs. Roosevelt Pays Tribute to Quentin

Paris.—Mrs. Theodore Roosevelt, accompanied by her son, Lieutenant Colonel Theodore Roosevelt, Jr., visited the grave of Lieutenant Quentin Roosevelt, near Fere-en-Tardenois, and laid flowers on the simple monument which marks her son's last resting place. The grave is being carefully tended by the inhabitants of the locality.

Cited for Bravery

Alfred B. Patterson, Jr., First Lieutenant, Pilot, Air Service, 93d Aero Squadron. For extraordinary heroism in action in the region of Moiry, France, September 29, 1918. While on a patrol with two other machines, he attacked an enemy formation of seven planes (Fokker type) that were protecting a biplace plane. They destroyed the biplace and four of the Fokkers, forcing the remaining three to retire. A bronze oak leaf, for extraordinary heroism in action in the region of Moiry, France, October 23, 1918. He led a formation for the purpose of protecting our bombing planes, the accompanying planes being obliged to return, due to engine trouble. Despite this fact, *Lieut. Patterson* proceeded on the mission alone. He sighted an enemy patrol of nine machines (Fokker type) and attacked them, driving one down.

Wilbur C. Suiter, First Lieutenant, Air Service, Pilot, 135th Aero Squadron. For extraordinary heroism in action near Vilcey-sur-Trey, France, Septembr 12, 1918. He, with *Second Lieut. Guy E. Morse,* Observer, fearlessly volunteered for the perilous mission of locating the enemy's advance unit in the rear of the Hindenburg line. Disregarding the hail of machine-gun fire and bursting anti-aircraft shell, they invaded the enemy territory at a low altitude and accomplished their mission, securing for our staff information of the greatest importance. These two gallant officers at once returned to the lines and undertook another reconnaissance mission, from which they failed to return.

Guy E. Morse, Second Lieutenant, Observer, 135th Aero Squadron. For extraordinary heroism in action near Vilcey-sur-Trey, France, September 12, 1918. He, with *First Lieut. Wilbur C. Suiter,* Pilot, fearlessly volunteered for the perilous mission of locating the enemy's advance unit in the rear of the Hindenburg line. Disregarding the hail of machine-gun fire and bursting anti-aircraft shell, they invaded the enemy's territory at low altitude and accomplished their mission successfully.

First Lieut. Frank Ordiscoll Hunter, Air Service, 130th Aero Pursuit Squadron. For the following act of extraordinary heroism in action near Verneville, France, September 17, 1918: Leading a patrol of three planes, *Lieutenant Hunter* attacked eight enemy machines. He then returned to the flight and succeeded in destroying another and driving off the others. Home address, John H. Hunter, father, 216 East Gaston Street, Savannah, Ga.

First Lieut. Ralph P. Bagby, Field Artillery, observer, 88th Aero Squadron. For extraordinary heroism in action near Tailley, France, November 2, 1918. *Lieutenant Bagby* and First Lieut. Louis G. Bernheimer, pilot, on their own initiative went on a reconnaissance mission, flying 50 kilometers behind the German lines, securing valuable information as to the condition of the bridges across the Meuse River and enemy activity in the back areas and also harassing enemy troops. Home address, R. J. Bagby, father, New Haven, Mo.

NAVAL and MILITARY AERONAUTICS

Key to Abbreviations

ABC—Report to Army Balloon School, Arcadia, Cal.
AGC—Report to Aviation Supply Depot, Garden City, L. I., N. Y.
AMV—Report to Aviation General Supply Depot, Morrison, Va.
ARV—Report to Aviation Supply Depot, Richmond, Va.
BFT—Report to Barron Field, Fort Worth, Tex.
CAF—Report to Carlstrom Field, Arcadia, Fla.
CFT—Report to Carruthers Field, Fort Worth, Texas.
CGC—Report to Aviation Concentration Camp, Garden City, L. I., N. Y.
CJS—Report to Camp Jackson, Columbia, S. C.
CJW—Report to Camp John Wise, San Antonia, Texas.
CRI—Report to Chanute Field, Rantoul, Ill.
CWT—Report to Call Field, Wichita Falls, Tex.
DAP—Report to Director of Aircraft Production, Washington, D. C.
DIS—Honorably discharged from service.
DMA—Report to Director of Military Aeronautics, Washington, D. C.
EOT—Report to Ellington Field, Olcott, Texas.
FOB—Report to Fort Omaha Balloon School, Omaha, Neb.
FSO—Report to Fort Sill School for Aerial Observers, Fort Sill, Okla.
GLC—Report to Gerstner Field, Lake Charles, La.
HHM—Report to Hazelhurst Field, Mineola, L. I., N. Y.
KST—Report to Kelly Field, San Antonio, Tex. (When specified in the order, the number of the field is given in parentheses.)
LDT—Report to Love Field, Dallas, Tex.
LHV—Report to Langley Field, Hampton, Va.
MAC—Report to March Field, Allesandro, Cal.
MDO—Report to McCook Field, Dayton, Ohio.
MIA—Report to U. S. Naval Air Station, Miami, Fla.
PFO—Report to Post Field, Fort Sill, Okla.
PMT—Report to Park Field, Millington, Tenn.
PWM—Report to Payne Field, West Point, Miss.
RSD—Report to Rockwell Field, San Diego, Cal.
RWT—Report to Rich Field, Waco, Tex.
TFT—Report to Taliaferro Field, Fort Worth, Tex. (When specified in the order, the number of the field is given in parentheses.)
TMA—Report to Taylor Field, Montgomery, Ala.
UTA—Report to School of Military Aeronautics, University of Texas, Austin Tex.
WDM—Wire Director of Military Aeronautics upon arrival.
WFO—Report to Wilbur Wright Field, Fairfield, Ohio.

Notes

Note 1—Report to places mentioned in the order named.

Note 2—Report to Washington, D. C., to Walter Reed General Hospital, Takoma Park, D. C.

Note 3—Report to Panama Canal Zone, Ancon, Panama, for duty.

Note 4—Report to Chicago, Ill., to district manager aircraft finance, Consumers Building, and wire DAP.

Note 5—Report to Pensacola, Fla., to naval air station.

Note 6—Report to Akron, Ohio, to Army Balloon and Airship Detachment for duty.

Note 7—Report to Honolulu, Hawaii, to commanding general Hawaiian Department.

Note 8—Report to 360 Madison Avenue, New York City, to district manager aircraft finance.

Note 9—Report to Chief of Technical Section, Division of Military Aeronautics, Dayton, Ohio.

SPECIAL Orders No. 37-40 Inclusive—

A	
Ayling, John G.	MIA
Austin, Charles B.	Note 3
B	
Blessley, Roland C.	Note 3
Birdsall, Raymond P.	DMA
Buchanan, Lester C. Gill	LDT
Burt, Byron T., Jr.	Note 6
Brooks, John B.	Note 7
Burns, Leroy W.	RSD
C	
Collins, Russell E.	Note 6
Cameron, Don R.	Note 6
Clare, Wilfred M.	Note 6
Cunnea, Louis J.	PMT
Connolly, Cecil H.	RSD
Case, Leland I.	KST
Carusi, Joseph S.	KST
D	
Duggen, James R.	Note 3
Desmond, James P.	KST
Day, John L.	PMT
E	
Edwards, William N.	Note 4
F	
Finley, Robert H.	Note 5
Faulk, Theodore E.	Note 5
G	
Gowans, Louis L.	RSD
Gaghagen, Howard H.	Note 2
Gibbs, William R.	PMT
Grimm, Alfred	DMA
Grimes, Gerald E.	KST
Gahris, Leroy E.	HHN
H	
Haddon, Julian B.	KST
Holton, Russell G.	DAP
Hightower, Alfred James	Note 8
Hill, Willard D.	FRF
Holden, Harlan W.	GLC
J	
Johnson, Walter S.	DAP
K	
Kingsland, George D.	Note 5
Kennedy, Frank M.	Note 5
King, Benjamin	DAP
Knight, William	Note 9
Knight, Herbert C.	LDT
L	
Lyon, Edward Crane	CAF
Leeburn, Leo J.	LDT
M	
Murtha, John T.	Note 2
Mills, Pittman W.	KST
Maranville, Clarence H.	MIA
Maenner, Theodore H.	Note 6
Mulliken, Harrall	DMA
Moore, Percy S.	CAF
Miller, Henry J.	DMA
Mc	
McMorrow, William F.	PMT
McDarment, Corley P.	PMT
McDonough, Harry L.	KST
McCabe, John H.	Note 3
P	
Phillips, Eldon P.	Note 6
R	
Ratliffe, George T.	KSTS
Smith, Fred H.	KST
Strong, Albertus	FOB
Seymour, Joseph	CGC
Smith, Stanley	RSD
Stealy, Clair Laurus	MAC
Strother, Samuel P.	AGC
Stack, Herbert J.	DMA
Souza, William B.	Note 3
Smith, Albert D.	DMA
T	
Tonkin, Thomas C.	Note 3
W	
Williams, John G.	Note 3
White, Willard Justin	CAF

Major Smith Ends Transcontinental Flight

San Diego, Cal., February 14.—Completing one of the record flights in aviation history, Major Albert Smith ended his flight across the country and back on February 14. Major Smith began his flight from San Diego to New York on December 4. Although a great many days have elapsed since the start of the flight, most of the time was spent along the Atlantic coast in flights from Long Island to Washington, and long stops prior to the start of the return journey.

On the last day of the flight Major Smith had breakfast at Fort Bliss, Texas, luncheon at Yuma, Arizona, and dinner at San Diego.

French Air Mission Coming

Paris. A French aviation mission will start for the United States on March 8 to demonstrate the degree of efficiency French aeroplanes have attained. The mission will take with it five of the fastest machines which have been turned out. One of the planes is fitted with a closed cabin for the use of the Americans who have been invited to accompany the mission, which will have five of the noted French aces as pilots for the machines.

Authority and Function of the Director of Air Service

To enable the Director of Air Service to exercise the necessary supervision, control and direction over the Bureau of Aircraft Production and the Division of Military Aeronautics, with which he is charged by direction of the Secretary of War, the following was announced by the Chief of Staff:

The Director of Air Service will carry out the duties of the Chief of the Air Service, as prescribed in Article LXXXI, Army Regulations, 1913. He will exercise, under the direction of the Chief of Staff, full and complete supervision, control, and direction over the Bureau of Aircraft Production and the Division of Military Aeronautics, in all that pertains to administration, supply, instruction, training, and discipline.

General Orders, No. 80, War Department, 1918, have been amended by striking out the words "the Directors of Military Aeronautics,—of Aircraft Production," and substituting the words "The Director of Air Service."

Fourragers

The Director of Military Aeronautics has just been advised by cable from General Pershing, that the 103d, Aero Squadron, formerly the Lafayette Escadrille, is one of the two organizations of the A. E. F. entitled to wear Fourragers awarded by the French government. This organization was awarded the Fourragers in the colors of the Croix de Guerre, having received two citations of the French Orders of the Army. The names of the individuals qualified to wear this decoration will be published shortly.

Military Aeronautics Strength

Figures prepared by the General Staff show that 60 per cent of Total Personnel of the Division of Military Aeronautics was Overseas on February 6th.

Distribution of personnel in United States and overseas at various dates is shown in the following diagram:

Date	*Number*		*Per Cent*	
	In U. S.	Overseas	U. S.	Overseas
Nov. 11	79,321	78,786	50	50
Nov. 18	80,689	78,973	51	49
Nov. 25	84,785	78,361	52	48
Dec. 2	84,844	78,061	52	48
Dec. 9	889,661	70,040	56	44
Dec. 21	81,607	61,245	57	43
Dec. 26	77,140	59,917	56	44
Jan. 6	67,833	59,584	53	47
Jan. 16	51,321	58,854	47	53
Jan. 23	46,467	58,133	44	56
Jan. 30	41,314	57,527	42	58
Feb. 6	37,537	56,299	40	60

Reduction of Personnel

The War Department recently announced that the Air Service Personnel, in Washington, had decreased as follows:

Division	Civilian Personnel Nov. 11	Net reduction Nov. 11-Feb. 7	Per cent decrease Nov. 11-Feb. 7
Aircraft Production	1,861	579	31

Military Aeronautics.	1,100	313	28
The Total Figures for whole War Department are	25,892	6,536	25

Cancelled Aircraft Contracts

The War Department has announced Aircraft Contract Cancellations to the value of contracts cancelled and suspended $469,000,000.

The following is a summary of cancellations and suspensions of contracts to Feb. 7th:

	Value	Per cent of total
Engines and spare parts	$250,107,551	53
Planes and spare parts	163,231,790	35
Chemicals	13,181,285*	3
Balloons and balloon supplies	9,877,356*	2
Instruments and accessories	9,864,238*	2
Fabrics, lumber and metals.	5,954,726*	1
Miscellaneous	16,631,047	4
Total	$468,847,993*	

* Reductions due to revision in cancellations of contracts.

Suspensions of Plane and Engine Contracts

The value of planes and engines delivered during the week ended February 7 was nearly $2,000,000, leaving a halance on order valued at over $10,000.00.

	Balance on order Nov. 11	Suspended Nov. 11 to Feb. 7	PER CENT		
Planes			Suspended	Delivered	Remaining
Service	$124,818,750	$113,968,750	91	8	
Adv. Training	12,203,600	9,677,700	79	18	3
Elem. Training	5,400,000	4,187,358	77	23	
Total	$142,422,350	$127,833,808	90	9	
Engines					
Service	$227,010,000	$193,452,000	85	14	
Adv. Training	31,377,500	14,926,295	48	27	25
Elem. Training	2,864,200	0		93	7
Total	$261,251,700	$208,378,295	80	17	3

331 Liberty Motors Remaining on Order

During the week ended February 7th a total of 189 Liberty motors were delivered, leaving 331 still on order. To date 20,147 have been produced.

The status of contracts on February 7th is shown below:

	Balance on order Nov. 11	Suspended Nov. 11 to Feb. 7	Delivered Nov. 11 to Feb. 7	PER CENT		
				Suspended	Delivered	Remaining
Nordyke-Marmon Co.	4,548	4,000	548	88	12	
Lincoln Motor Corp.	13,228	10,500	2,728	79	21	
Packard Motor Car Co.	7,373	5,600	1,473	76	20	4
General Motors Corp.	3,430	2,472	927	72	27	1
Ford Motor Co.	1,947	1,050	897	54	46	
Total	30,526	23,622	6,573	77	22	1

42 De Haviland 4 Planes Remaining on Order

Deliveries of De Haviland 4 planes during the week ended February 7 were 5, leaving 42 still on order. A total of 4,600 exclusive of 204 shipped without engines, have been produced.

The status of contracts on February 7 is shown below:

	Balance on order Nov. 11	Suspended Nov. 11 to Feb. 7	Delivered Nov. 11 to Feb. 7	PER CENT		
				Suspended	Delivered	Remaining
Standard Airc. Corp.	421	360	61	86	14	
Fisher Body Corp.	3,031	2,400	631	79	21	
Dayton Wright Air. Co.	2,623	1,900	681	72	26	2
Total	6,075	4,660	1,373	77	22	1

7th Aero Squadron

Reporting from France Field, Cristobal, Canal Zone, on January 25, 1919, the Information Officer writes as follows:

"This week a flight was made to San Blas, R. P., in an HSIL flying boat, a distance of 180 miles being covered in aboui 140 minutes. On the trip to San Blas the boat carried four passengers (including pilots) and about 200 pounds of extra equipment. Two of the passengers were Air Service men who are on hunting pass, and in addition will make a hurried survey of conditions in the San Blas territory. The San Blas tribe of Indians is an old race, with many historical traditions. They have never been conquered, and the Panamanian Government is making some effort to educate them and to strengthen their allegiance to the Republic. A peculiarly shy and child-like people, these Indians have many habits of dress and adornment which are interesting. All their women wear nose rings of imitation gold almost from infancy, cover their heads and faces with cheap cotton shawls of elaborate design, wrap their legs tightly with a fabric strip and paint a stripe of varying color on their noses. The chief men are distinguished by circular earrings, also of imitation gold.

New Gas Station

The Panamanian Governor of the Province offered to allow the use of a portion of the Capital Island, Porvenir, for aviation purposes, and to build a gas station there. Co-operating with Navy aviation officers, the commanding officer of France Field plans to visit Porvenir within the next week in a Navy submarine chaser and one of France Field's boats, the U. S. A. David Putnam, and complete arrangements for the establishment of this gasoline station. This base will assist the operation of sea planes from France Field along the entire Atlantic coast of Panama, a distance of approximately 700 miles. The value of establishing gasoline stations of this kind is apparent when it is learned from Navy sources that six Curtiss NC1 flying boats are capable of landing 200 soldiers and equipment at any point along a 700-mile coast line in about three hours' time.

The 64th Balloon Company

Lieut. Col. H. B. S. Burwell, J. M. A., Commanding Officer of Rockwell Field, has commended the Commanding Officer, Arcadia Balloon School, on his co-operation in the Rockwell Field "Flying Circus," as follows:

"It is desired to extend to you my sincere thanks and appreciation for the wonderful way in which you co-operated with us in making the Rockwell Field 'Flying Circus' a success. The presence of the balloon company was one of the principal features of the circus, and the work done by the officers and enlisted men of that command is appreciated by myself and every member of this command.

"In spite of the very unfavorable weather conditions you were able to carry out your end of the program to the complete satisfaction of everyone present. It was a great pleasure to have you here as our guests, and our one regret is that we were not able to show how fully we appreciated the great trouble that you went to in bringing down the balloon company and equipment.

"The circus was a financial success and netted a substantial sum which will be used for the benefit of the enlisted men. Should you decide to stage a similar show at Arcadia you can rest assured that we will do everything in our power to co-operate with you in the way of furnishing aeroplanes and pilots and any other equipment at our command."

Lieut. Col. Mygatt conveyed the message to the 64th Balloon Company with the following indorsement:

"The work of the 64th Balloon Company, during the Flying Circus at Rockwell Field, is greatly appreciated by the Commanding Officer at that station. He states that the presence of the Balloon Company was one of the principal features of the circus, and the work done by the officers and enlisted men of this company was appreciated by himself and every member of his command. The handling of the balloon was excellent and the parachute jumps were perfect. The discipline and appearance of the company, in spite of the inclement weather and excessive work because of it, was all that could be desired. The Commanding Officer takes this opportunity to thank the officers and men of the 64th Balloon Company, and the officers attached to it, for their excellent work. A thorough performance of duty such as this reflects great credit upon the Balloon Service."

Firing Commands by Radio Telephone

A Field Artillery Brigade in action, with its Artillery Commander 2000 feet up in the air observing and giving firing commands direct, is the latest situation in aerial adjustment brought about by the use of the radio telephone.

Obviously, it cuts the time in field artillery response. Under the old system of airplane observation, it took from an hour to an hour and a half to adjust the fire of one gun, the time being taken in giving commands to the battery. By using the radio telephone and giving the firing commands direct,—as can be done by the aviator if he is a trained artilleryman,—the time for making all shifts and range changes can be more than quartered; and in this same less-than-one-fourth of the time, more than one gun can be brought into the action, and even the fire of a whole platoon.

These are actual results from recent experiments with the radio telephone between an airplane from Rockwell Field, San Diego, Cal., and a battery of field artillery training at Camp Kearney.

The aeroplanes used in these experiments have been the Curtiss JN4-H equipped with SCR 68 sets. An SCR 59 set has been used on the ground with SCR 53 antenna unit. (Radio phone.) The practice work is being carried on at regular intervals.

Brigadier General Hand, commanding the 16th Field Artillery Brigade, in giving his report of two days of cooperation between airplane and battery in the earlier days of this practice, has shown incidentally of what stuff aviators are made. Following is an extract from the General's report:

"Yesterday and today we have had firing by aerial adjustment from airplane using the telephone. The ground aerials were set up right at the battery, the executive officer wearing the telephone headdress. All the conduct of fire was by an aviator.

"The aviator who did the adjustment received the first lesson in adjusting fire by me 15 minutes before he went up, and that is all he knew about artillery fire. He was very bright, however, and on his first problem gave the proper commands for shifting his gun into its target and all the proper range changes throughout precision adjustment, including improvement fire. The first problem was 22 rounds, and lasted 19 minutes from the time he left the ground until the last shot. I had him actually give the firing commands, and he sent us no sensings whatsoever. In other words, he was battery commander. The second problem he secured his adjusted range and fired six rounds in improvement fire, making a total of 16, in 14 minutes. Included in this 14 minutes, he had given the commands to bring in the second gun. This morning, he went up, adjusted two guns of a platoon separately, brought in the whole platoon in fire for effect, making his corrections properly, and total time from his leaving the ground to last shot—21 minutes; total rounds fired—47.

"We all were greatly pleased with the results, and to my mind it means a revolution in aerial adjustment. If the aviator is a trained artilleryman, he can handle this fire with the ease, speed, and facility which one could do under the very easiest of terrestrial observation conditions. There was none of the long, tiresome delay such as I have been used to under our old system, as, you know, it took us about an hour or hour and a half, if we were lucky, to adjust one gun by airplane. The ship flew at about 2000 feet. I don't see why it wouldn't be possible to even pick up a fleeting target and adjust shrapnel fire with all the guns. Of course the height of burst might give him trouble, but take it on the proper proportion of air and graze, the trained field artillerymen should be able to handle it, and possibly one could get a very good idea after practice by rating the relation of the pattern to the burst, and be able to tell something about the height.

"However, to sum up my whole observation so far, I believe from now on where the phone can be used, and we have trained observers, they should give the firing commands direct instead of sending sensing down, and waiting for the ground people to transpose them to the battery. The ship we used had only one-way communication, but in a few days they expect to have apparatus so that we can also talk from the ground. That will make everything simple.

"I forgot to tell you that we purposely gave him a good error in deflection each time he was up, and we had no difficulty in making the proper shift. The accuracy of firing speaks for itself. In one problem he had three target hits during improvement and another one two. . . ."

FOREIGN NEWS

Ready to Fly to America

London, Feb. 16.—The 670-foot airship is ready at Glasgow awaiting favorable weather for a trans-Atlantic flight to America, the *Daily Chronicle* states.

The trip is expected to take eight days without stop (round trip). The airship will carry thirty tons. Strikes prevented an earlier demonstration, it is averred.

The machine is driven by six powerful engines under dual control. It is expected to be capable of forty hours' flight at a speed a little under 100 miles per hour.

Army Arranges Aeroplane Courier Service In Europe

Berlin, Feb. 18 (by the Associated Press).—American officers are endeavoring to arrange for an aeroplane courier service to connect various military missions at different points in the Central Empires and in new states with the American base in France. Present communications are difficult and unsatisfactory, particularly with Prague and Warsaw.

Germans Have Built Super-Plane

Berlin, Sunday (by the Associated Press).—If the war had lasted a few months longer Germany was prepared to surprise the world with an enormous aeroplane. The new giant of the air, which was planned by Harold Wolff, an engineer, will have its first trial at Doberitz within a few days.

The new machine is nearly 165 feet from wing tip to wing tip and stands more than 23 feet high. It has six motors with a total of 1,800 H.P., and is driven by four propellers, two of which are forward and two aft. Each of the propellers has four blades. The two motors, it is said, can stop simultaneously without affecting any of the propellers or having any result except to reduce the speed of the aeroplane.

Apart from its dimensions and power the new aeroplane is not only equipped with devices enabling the pilots to know at all times their altitude and angle of elevation, but also with devices to tell the absolute as well as relative direction, which it is believed will make flying possible on the darkest night and in the thickest fog. This device is an improved radio direction finder.

French Aviation Mission Coming to the United States

Paris, Feb. 16.—On March 8 a French aviation mission will leave for the United States with the object of demonstrating the degree of efficiency French aeroplanes have attained. The mission will take with it five of the fastest machines that have been turned out, of various makes.

The itinerary of the mission covers New York, San Francisco, Los Angeles and New Orleans, with a return to New York, the various stage sbeing covered by air. The mission will take with it a collection of paintings and photographs illustrating air episodes of the war. These pictures will be put on exhibition.

Huge Handley Page Machine Makes Long Flight

A Handley-Page aeroplane, fitted with four 350 H.P. Rolls-Royce engines, flew from Belfast to Sheffield on January 18. The total weight on board was 12 tons, including a crew of seven and a half a ton of baggage. The time taken by the flight was 2 hours and 35 minutes.

Flies Across Mediterranean

Lieut. Roget and Captain Cole, in a military biplane, propelled by a 300 H.P. motor, succeeded in flying across the Mediterranean from Marseilles to Algiers on January 26. They started from Istres in Bouches-du-Rhone at 2 A. M. and landed at Algiers five hours later. After a rest of about an hour they set off on the 500-mile journey back to France, but were forced to land at 7 P. M. at Rosas in Catalonia, having lost their way in the mistral and flown for about 1,000 miles over the Mediterranean, which they crossed twice.

Germans Have Surrendered 1,700 Aeroplanes to British

London.—In behalf of the Government it was announced in the House of Commons that the Germans had turned over 1,700 aeroplanes to the British Army.

No Zeppelins In Jutland Battle

A Zeppelin officer, discussing the Jutland battle with a member of the Allied Naval Commission in German waters, said it was not true that they had any Zeppelins on reconnaissance on the day of the battle. Had that been the case, the German fleet would certainly have avoided battle, the German officer said.

Italians Developed New Observation Balloon

Rome.—The chief of the Aerostatic Section of the Italian Army, Major Avoria and Signor Prassove, Director of the Italian Army Aircraft Works, produced, just prior to the signing of the armistice, a new type of observation balloon, which proved much more satisfactory than the Parseval-Sigsteld or Tribolal Caquot balloon. The new type is essentially a spherical aerostatic fitted with what are equivalent to stabilizing fins and acting as a kite. It may be employed in winds of over 55 miles an hour, while the Parseval type could not be used safely in winds exceeding 12 miles an hour. The new type requires less gas and owing to its smaller dimensions, is easily transported and housed, and safer from hostile fire. A further advantage in the employment of mooring cables of smaller section follows from its smaller head resistance, while should the mooring cable snap, the balloon may be navigated as a free balloon.

Dismantled German Ships As Aerial Landing Places

London.—Commenting on the suggestion that Germany's battleships be destroyed rather than distributed among Allied powers, a British publication suggests their utilization as aerial landing stations in trans-Atlantic air lanes. Mid-Atlantic stopping places of this kind would certainly be an excellent field of utility for obsolete warcraft.

Airwomen Banned By England

London.—An order has been issued oy the Air Council forbidding women in the Woman's Royal Air Force from learning to fly, owing to the shortage of aircraft supplies. The restriction is said to be of temporary character only.

British Aeronautic Industry Has Tremendous Capacity

London.—The Advisory Committee of the Ministry of Reconstruction appointed to consider the establishment of new industries has estimated that existing aircraft factories in England are capable of producing 40,000 aeroplanes and 30,000 motors a year, in addition to sufficient spare parts to supply replacements for an air force of that size.

Australia Has Commercial Aeronautic Plans

Auckland, New Zealand.—The Minister of Posts and Telegraphs in New Zealand is supporting a movement for the establishment of aerial transport and aerial mail lines between various parts of New Zealand, extending from Auckland to Dunedin, a distance of 700 miles, and between New Zealand and Australia

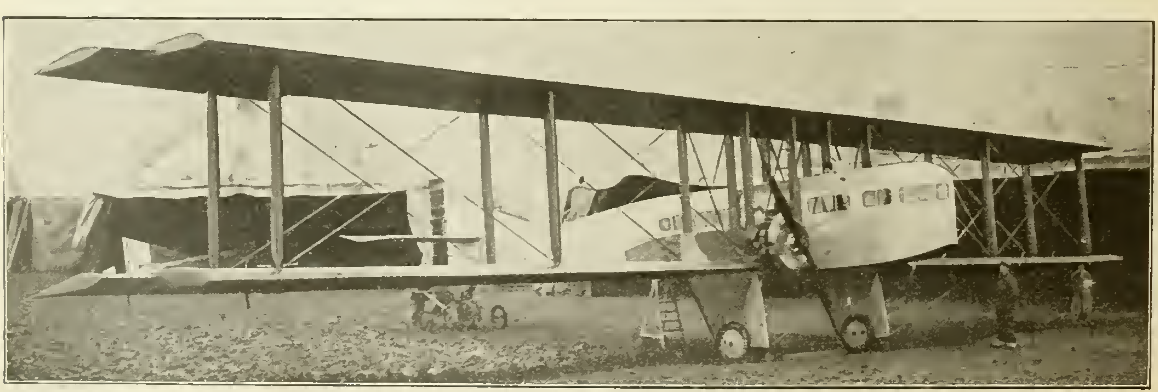
Mr. L. A. Walsh, the managing director of Walsh Brothers and Dexter, Ltd., aeronautical constructors and engineers, who was in charge of the training of military aviators during the war; has been one of the moving spirits in the development of these plans. Under his direction several types of single and twin-motored flying boats have been constructed, employing Hall-Scott motors for propulsion.

A large number of military fliers will be available for operating commercial aircraft.

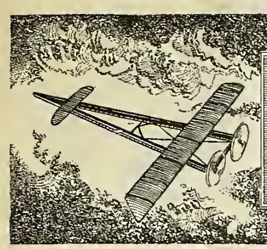
British Develop New Airship

London, Feb. 14.—The *Daily Mail* publishes the first particulars of one of the latest types of British rigid airships, the building of which has been done secretly. These vessels, known as the "33" class, are virtually equal in size to the most successful type of Zeppelin, and the preliminary tests have shown that they will equal, if not exceed, Zeppelin performances.

Their length is said to be 670 feet and the diameter seventy-nine feet. Weight in flying trim will be more than 600 tons, including a carrying capacity of between twenty-seven and thirty tons. For war purposes she was to have carried four 580-pound and eight 250-pound bombs, also machine and other guns fore, aft and on top.

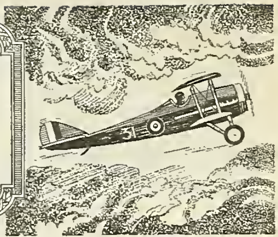


The Farman "Aerobus" being used in the Paris-London service. Two Salsmon engines are used. Note the wing end ailerons



ELEMENTARY AERONAUTICS and MODEL NOTES

By John F. McMahon



CLUBS

PACIFIC NORTHWEST MODEL AERO CLUB
921 Ravenna Boulevard, Seattle, Wash.
BAY RIDGE MODEL CLUB
8730 Ridge Boulevard, Bay Ridge, Brooklyn
INDIANA UNIVERSITY AERO SCIENCE CLUB
Bloomington, Indiana
BROADWAY MODEL AERO CLUB
931 North Broadway, Baltimore, Md.
TRIANGLE MODEL AERO CLUB
Baltimore, Md.
NEBRASKA MODEL AERO CLUB
Lincoln, Nebraska

DENVER MODEL AERO CLUB
2820 Raleigh St., Denver, Colo.
BUFFALO AERO SCIENCE CLUB
c/o Christian Weyand, 48 Dodge St., Buffalo, N. Y.
THE ILLINOIS MODEL AERO CLUB
Room 130, Auditorium Hotel, Chicago, Ill.
SCOUT MODEL AERO CLUB
304 Chamber of Commerce Bldg., Indianapolis, Indiana
MILWAUKEE MODEL AERO CLUB
455 Murray Ave., Milwaukee, Wis.

CONCORD MODEL AERO CLUB
c/o Edward P. Warner, Concord, Mass.
MODEL AERO CLUB OF OXFORD
Oxford, Pa.
CAPITOL MODEL AERO CLUB
1726 M Street, N. W., Washington, D. C.
CORRESPONDENCE MODEL AERO CLUB
320 N. Main Street, Rockford, Ills.
AERO CLUB OF LANE TECHNICAL HIGH SCHOOL
Sedgwick & Division Streets, Chicago, Ill.

Model Aeroplane Building as a Step to Aeronautical Engineering

OWING to the enormous inquiries in reference to the light type aeroplane received while the articles on the Ford Motored Aeroplane were being described the author has decided to give specifications and general details for building a motorcycle engine driven machine.

Some people have an idea that a motorcycle engine is not powerful enough to propel a machine through the air, but this idea is incorrect, because years ago A. V. Roe, of England, proved that he could fly with but 3 horsepower, this was not a mere hop in the air and then back to earth again, but a real honest straightway flight.

Again our Mr. Sellars flew a quadruplane having only an 8 horsepower motorcycle engine for his power plant and he is officially credited with successful flights of a mile or more. These were only experimental flights and no doubt longer ones could be accomplished if the designer so desired.

These machines were not as efficient as the machines of to-day because the aeroplane builders of those days did not have the dope to go by and very little was known about lift coefficients, etc., and it is marvelous to think that these pioneers accomplished as much as they did with the meager figures and data they had on hand.

Emil Laird, a bright young man of the Illinois Model Aero Club, startled the aviation world a few years ago by building a little biplane of about 20 feet spread and powered with a special cylinder air-cooled motor of light weight which was made of cylinders of a well-known automobile motor. This motor of Laird's was rated at about 12 h.p., but it was powerful enough to carry him all around the United States giving exhibitions at the fairs.

Later Laird built a machine powered with an Excelsior motorcycle engine and it was a good flyer. The only fault that the designer could find with it was that the engine heated up badly and the flights were shortened thereby. The heating up of the engine may have been caused by one of a few reasons, namely: overload caused by the propeller being too high pitch or too large diameter, engine not timed properly for the speed of engine or engine running wild due to propeller being too light pitch or diameter. A motor bears up unless we have the particular motor near us and we make a careful investigation of the case.

Recently a photograph of a motorcycle engine driven monoplane was shown in Aerial Age and the designer claimed a speed of over 50 m.p.h. with a stock motorcycle engine.

We can get encouragement by looking back to the days when the Wrights flew a machine with a great spread of wing and drove it through the air with twin propellers turning in opposite directions by a bicycle chain transmission driven by a 12 h.p. motor, and you will be amazed when you hear that the lifting efficiency of the wings was only 70%.

Later Nieuport developed a monoplane which has since became famous for its great speed for low horse power and which flew at the rate of 68 miles per hour with an 18 h.p. two cylinder opposed motor.

The foregoing well-known machines are mentioned merely to give the reader encouragement and to give him something as a guide, and by which he can check performances.

Drawings will be given showing the power plant which is a three cylinder "V" motor made up from three stock motorcycle cylinders and which should develop about 25 h.p., also drawings showing general construction and assembly of the machine will be given.

Fittings will not be described, as the fittings that were designed for the Ford Motored Aeroplane can be used for this machine. (In answer to numerous inquiries and for those who wish to know where they can purchase metal fittings and machine work, I refer you to The Jennings Machine Works, Uniontown, Pennsylvania, who have made a specialty of making fittings for the machine described in the preecding articles for a nominal sum.) The general construction will be much the same only over all dimensions and wing curve will be different.

Model Aeroplane Contest

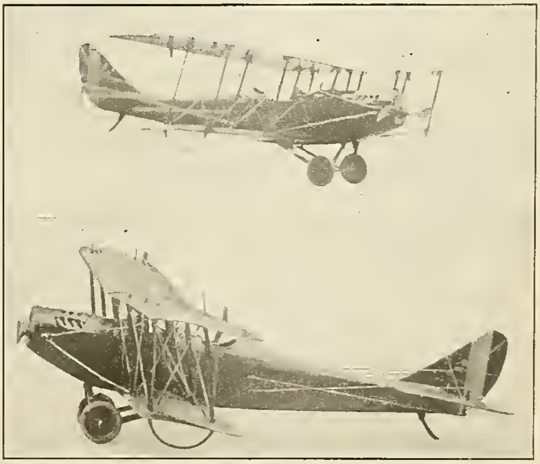
We have received many entries for the contests from all over the country, and most of the entrants ask for an answer to their letters or post cards as the case may be.

It is impossible to answer all of these communications, and in the future we will enter the applicant's name and he will be eligible to complete. In fact any builder or flyer of model aeroplane is eligible, and it makes no difference what type or make of machine the model is patterned after so long as the entrant has built it himself.

This information is for some readers who think that the models must be built according to drawings which appeared in the "Elementary Aeronautics" columns.

Model Curtiss J N 4

The Model Curtiss JN4 shown in the accompanying illustration was built by Harold Morehouse of Detroit, a member of the Illinois Model Aero Club and now employed by the Dayton Wright Company as draughtsman. The model is correct in every detail, the controls working and connected dual as on the big machines. The covering is tracing cloth such as found in draughting rooms, the sizing being washed out of it. It is fastened in the regular way and doped. It is interesting to compare these photos with those of a large machine and note the resemblance to its large prototype.



Model of a Curtiss Aeroplane which shows careful construction. Controls can be operated as in the big machines

Aeronitis is a pleasant, a decidedly infectious ailment, which makes its victims "flighty," mentally and physically. At times it has a pathologic, at times merely a psychologic foundation. It already has affected thousands; it will get the rest of the world in time. Its symptoms vary in each case and each victim has a different story to tell. When you finish this column YOU may be infected, and may have a story all of your own. If so, your contribution will be welcomed by your fellow AERONUTS. Initials of contributor will be printed when requested.

Intelligent Female (to balloon officer of observation sausage): "I wonder you don't have a ladder or a fire escape or something of that sort instead of just having that rope to climb up and down."

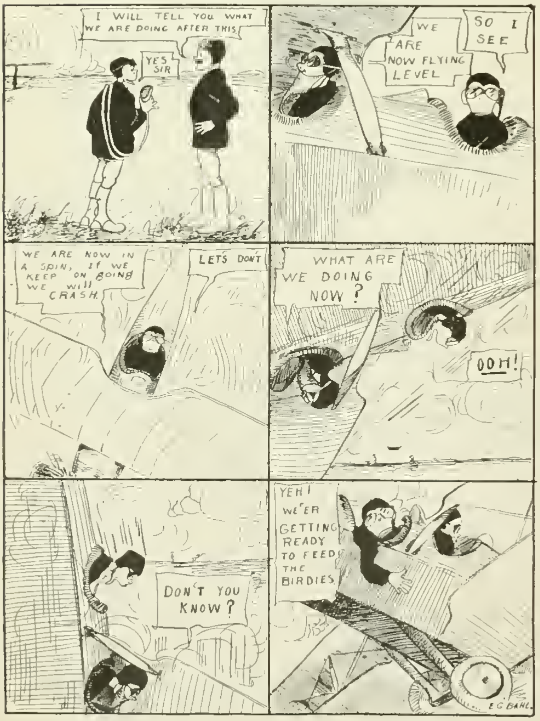
Aerodrome Proverbs

It's the last bump that breaks the chassis strut.
A switch off in time saves nine days in the repair shop.

"Owed" to a Night Bomber

Hear! Meccano, ere you crank,
This foolish looking flying tank!
Let me on your mind impress
With the utmost earnestness,
Grasp this order without fail,
Don't get tangled in my tail.
Knight o' the sparkplug, hear my vow,
There will be one hellva' row,
Take it even now from me,
It'll be the end of you an' me.
If you'd escape my rage
Guardez vous mon empennage.

From *The Olympian.*


I WILL TELL YOU WHAT WE ARE DOING AFTER THIS
YES SIR
WE ARE NOW FLYING LEVEL
SO I SEE
WE ARE NOW IN A SPIN, IF WE KEEP ON GOING WE WILL CRASH.
LETS DONT
WHAT ARE WE DOING NOW?
OOH!
DON'T YOU KNOW?
YEH! WE'ER GETTING READY TO FEED THE BIRDIES
E.G. BAHL

Tailspin Mac takes a ride under gosport system
(*From "Rich Field Flyer"*)

I ought to get a good job during the election.
Why?
I've spent the last four years ladling out "dope."

Talking about American flying bobbies. "Yes, your wushup, I was on duty in Section XII when I saw the prisoner. He was driving his plane at a furious pace and flying on the wrong side of a cloud. Held up my hand to stop him, but he took no notice, and after nearly colliding with a nursemaid on her aerial pram, he crashed right into the doorway of the 'Aviators' Rest,' causing the same to rock and nearly break from her guys." From *Aircraft* (London)

It was a wet day, and the 'bus was skidding all the way up Ludgate Hill.

"What's the matter, conductor," asked the nervous old gent in the corner.

"Driver's just been demobilized from the R. A. F., sir, and when he saw that aeroplane overhead, sir, he got the wind-up and tried to do the Immelman turn."

America has decided to have Flying Policemen. For the love of anything, don't drop the "F" from the adjective, Mr. Printer, or the Force will think we've done it on purpose.—*Aircraft.*

Air-Raided Padua

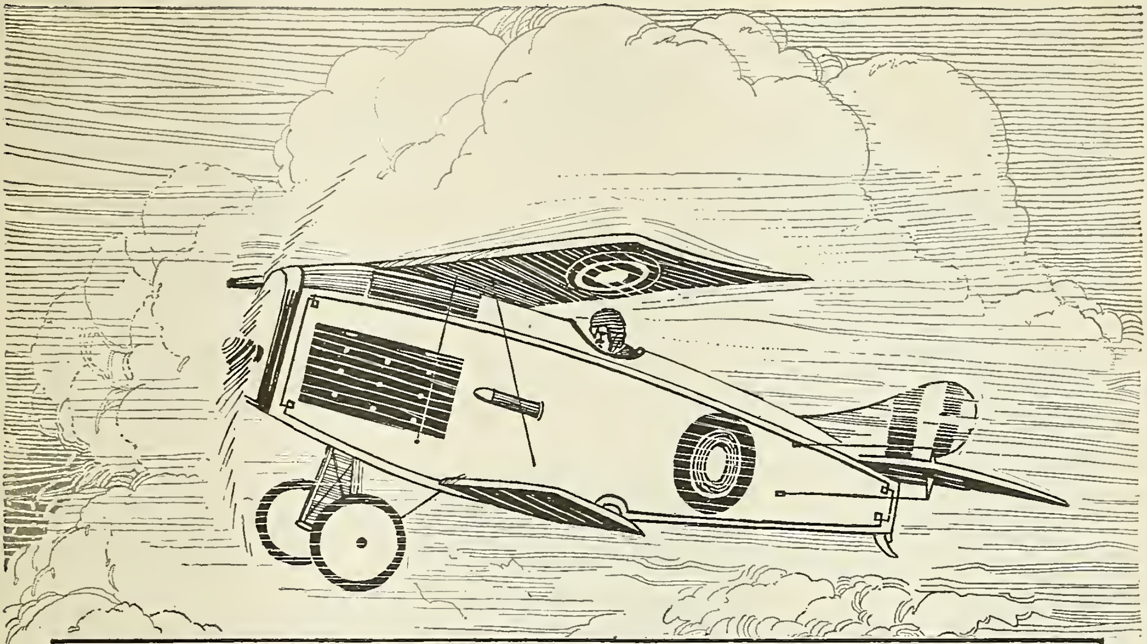
A heritage of Ilium's glory vast,
  O "happy Padua," to thee belongs!
For here Antenor came, his trials past,
  Whose ancient fame the Mantuan bard prolongs;
  Here Dante dwelt and here he saw the throngs
Of shades within Inferno's gloomy bound;
  And here once Petrarch sang his sad, sweet songs
Of "ceaseless sorrow" that loved Laura crowned
And make his tomb at Arqua, still a shrine renowned.

Thy storied name is crowned with memories bright,
  And at its bidding come from History's page
Majestic shades of Rome's young, growing might,
  By Livy told, and read from age to age.
  Thou art the goal of many a pilgrimage—
Of Art and Learning thou art still a shrine
  That guards for all the world rich heritage.
Loved still art thou by all the Muses nine—
'Neath blue Italian skies fair rise thy domes divine!

And not alone to thine own clime and race,
  "Fair Padua, nursery of arts," hast thou
Been inspiration; thou hast won a place
  On page of him to whom all poets bow
  As King; Bianca and fair Portia now
Lend thee a grace that every reader thrills
  And with their beauty's spell they thee endow.
But stay; What is that sound that o'er thee shrills?
What shadow dread flits from the Euganean hills?

Now o'er thy cupolas and towers high
  There hover birds of prey on ruin bent;
A vandal foe to Padua draws nigh,
  His winged couriers to thee are sent
  And on thy shrines drop from the firmament
Dread bolts that far and wide destruction spread.
  Shall storied Padua be in ruin blent?
A foe has come who spares nor quick nor dead—
'Gainst Art and shrines divine Thor's flaming bolts are sped!

—H. T. Sudduth, in the *New York Times.*



The Christmas "Bullet"— Valsparred, of course!

The Christmas "Bullet," is a business-like looking machine, designed by Dr. William Whitney Christmas. It is the first "strutless" biplane. The wings are flexible and during flight they bow, giving them the appearance of a bird's wings.

Equipped with a Liberty Six, which is rated 185 h.p., a speed of 197 miles per hour was made by this plane at Government Experimental Field No. 1 (near Central Park, L. I.) on December 3rd and 7th, before Col. Harmon and his staff.

Naturally, Valspar was used on the varnished portions of this plane. No other varnish made is elastic enough to stand the terrific vibration of this machine, whiz-z-z-ing through the air at 197 miles an hour.

Valspar resists *all* of the destructive effects of high speed and hard usage in airplane service and retains its protective qualities long after ordinary varnish requires renewal.

In constant use in the air service of the Allies during the war, Valspar was the one varnish that satisfied *all* of the exacting requirements.

Our Airplane Department will gladly afford information and assistance in solving your varnish problems. To Purchasing Agents and Superintendents of Production: We will send our book on airplane finishing free on request.

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(Continued from page 1241)

three methods which have been outlined it is generally green and wet with steam, and must be thoroughly dried before being either stored or made into plywood. The drying process is a very simple one. It consists merely in drawing air, which has been dried and heated by passage over steam pipes, through the room or rooms in which the veneer is stacked. A temperature of 100 to 110 degrees Fahrenheit is maintained. When the air has become nearly saturated with moisture from the veneer it is sucked out by fans that keep up a continuous circulation. A drying period of from 12 to 13 hours is sufficient, as a rule, for veneer which does not exceed 1/16 inch in thickness, and for greater thicknesses a proportionately longer time is necessary.

Stacking Veneer.—It is most important that the sheets of veneer be so stacked as to insure a ready access of air. The methods employed depend largely on the size and shape of the stock. The comparatively long and narrow sheets from the veneer saws or the slicer are placed in "tooth racks" which consist of pickets about 30 inches long placed in pairs, their lower ends fitted into mortises cut in a piece of scantling so that the clear space between them is ¼ inch. The veneer is supported every 2 or 3 feet by these pickets. Unless the sheets are fairly thick two are placed back to back in these racks and if they are not more than 12 to 15 inches wide they may be stacked edge on edge, two or more deep. The air has always full access.

What is known as the "protected end" method is employed when the sheets are wide and short; that is, not more than 3 feet long. Light boards with vertical grooves cut in them every 3 or 4 inches replace the pickets. The distance between these parallel boards or holders is varied according to the length of the veneer sheets, which are slipped into the grooves. In this way the ends of the sheets are protected, or prevented from cracking and warping while drying.

For rotary cut veneer—which for the most part is short and very wide—a third method called the "hanging process" is used. Lengths of from 6 inches to 3 or 4 feet, or even more, and widths of any dimension can be handled. Pairs of parallel wires, spaced 15 inches apart, are strung across the room about 5 feet above the floor. Each pair of wires supports a number of light wood cross members that project a little below the wires, and near their lower edge are driven nails which project an inch on each side of the stick. The sheets of veneer are hung from a cross-stick by these nails, which are struck through the piece close to its upper edge. When the width of the sheet is greater than the distance of the wires from the floor it is folded, and the other edge of the sheet is supported by the nails on the opposite side of the cross-stick. Very wide sheets and lengths greater than 20 inches are ordinarily suspended from two or more sets of wires.

After the veneer has been dried it is taken either directly to the cutting and gluing rooms to be made into plywood or to the storeroom for future use. Here it is kept in low piles containing all the veneer cut from one log, and marked with the log number. Since it may have absorbed some moisture while in the storeroom, veneer, before it can be used, must first be put through a re-drying press. Such a press consists of a series of heavy, hollow iron plates, sliding up and down in an open steel frame, heated by live steam and forced together both by their own weight and by the pressure of steam acting on a piston. Only 5 or 10 minutes is necessary to complete the re-drying of veneer of the usual thickness. Lack of care in this operation may cause a glossing of the surface of the veneer that is apt to render gluing difficult.

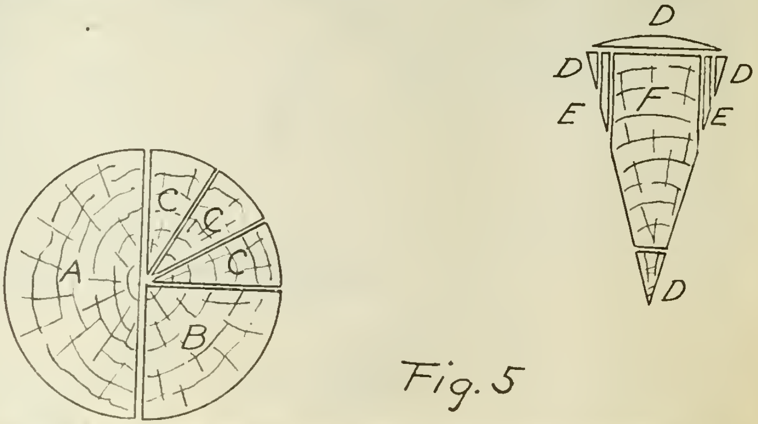

Fig. 5

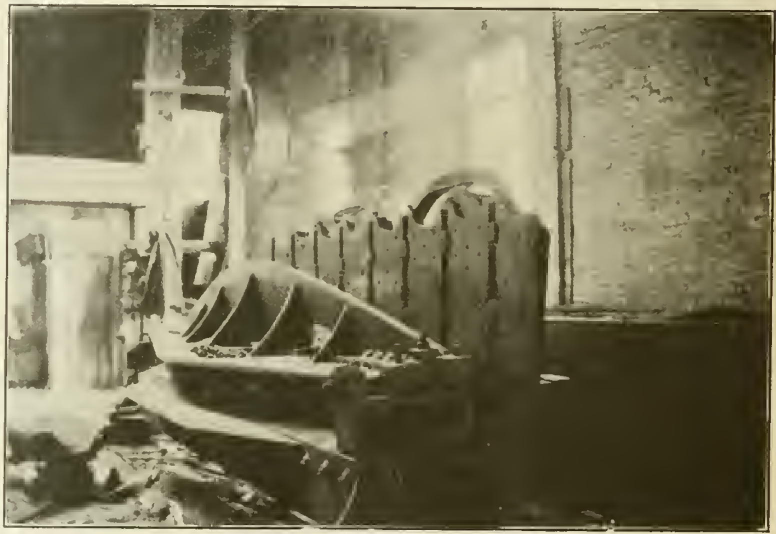

Fig. 6—Front view of slicer

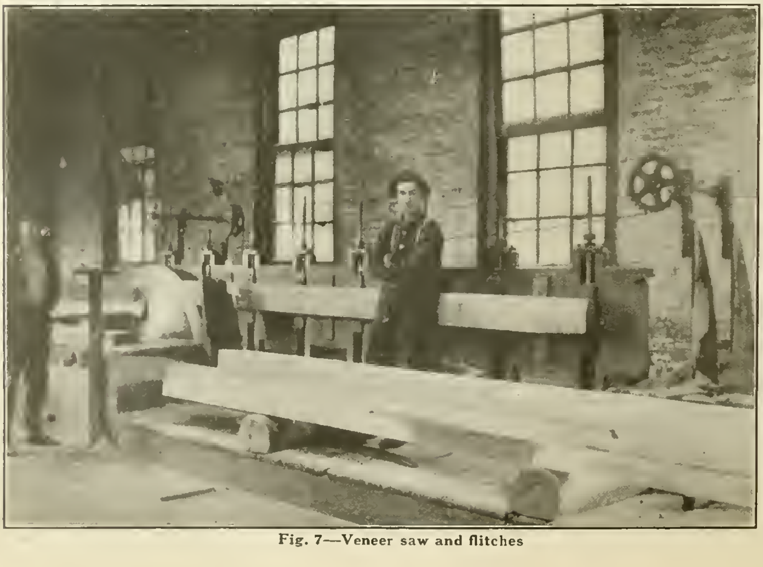

Fig. 7—Veneer saw and flitches

The Manufacture of Plywood

The first step in the manufacture of plywood is to cut the sheets of veneer to gross lengths and widths which are such that an ample allowance is made for later trimming to the exact dimensions specified in the order to be filled. Uniformity and speed are secured by the use of double header saws, both cross-cut and rip. With sawn or sliced veneer the sheets are usually so narrow that two or more must be spliced together.

Jointing and Splicing.—To secure square, straight edges the sheets are put through a jointer. A sufficient number to make a thickness of 3 inches are placed on the bed of this machine and are carried over a knife, gripped between a series of rolls and a roughened, endless chain. But one man is needed for the operation of a jointer. The veneer now passes to the splicer, where enough sheets are joined to give the required width. The operator takes up two pieces of veneer, places them on the smooth bed of the splicer and, pressing the edges together, starts the sheets under a roller which forces them still closer. At the same time a strip of gummed paper an inch wide is moistened and drawn through the roll with the veneer. This serves to fasten the pieces together. It is applied only to the outside surface of the outer plies of veneer, because if it were used on the inner surfaces of the plies the panel would not be waterproof. No glue whatever is applied to the joint, which is perfectly flexible. In a panel the inner layers of veneer, for which, as a rule, the softer, cheaper woods are used, do not need splicing, as they are rotary cut and hence can be of any width. Two men are necessary to run a splicer.

Gluing Up Panels.—The operation next in

(Continued on page 1285)

WE BELIEVE in the future of aircraft in the United States. As an evidence of this belief we are exhibiting at the Aeronautical Show in New York City two Packard aircraft engines—an eight and a twelve—also a new type of plane designed by Packard engineers.

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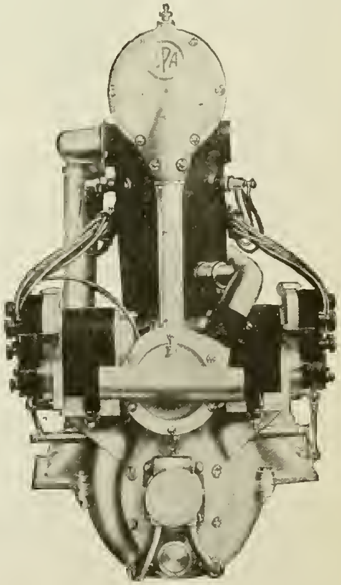

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COMPARISON OF RESISTANCE AND WEIGHT OF K-BAR AND DOUBLE LIFT TRUSS SYSTEMS

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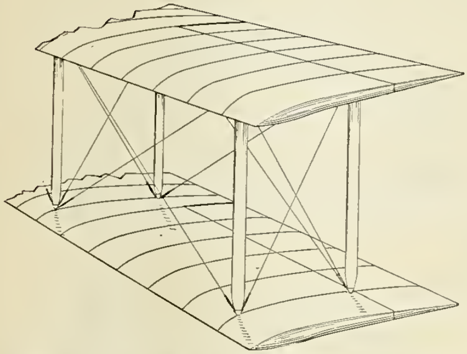
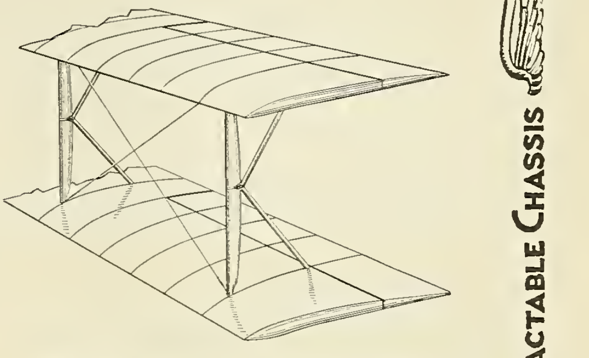




The following is an exact Comparison of Resistance and Weight:

At a speed of 100 M.P.H.,
Wing loading of 9#/sq. ft.,
Safety factor of 8,
Aspect ratio of 6,
Gap/chord ratio of K-Bar Truss...1.143
Gap/chord ratio of Double Lift Truss...1.000

Resistance of K-Bar Truss is $\frac{97.2}{185.0}$ = 52.5% of resistance of Double Lift Truss.

Weight of K-Bar Truss is $\frac{106.45}{146.57}$ = 72.7% weight of Double Lift Truss.

RESISTANCE AND WEIGHT OF K-BAR TRUSS SYSTEM

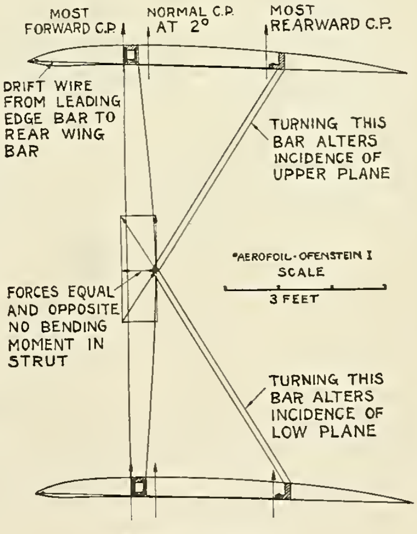
Member	Size"	Length"	Area Sq. Ft.	Kx	No.	Rx #	Wt. #
Inner Panel Lift Wire	1/2	141	.49	.0026	2	25.4	19.1
Inner Panel Landing Wire	5/16	141	.306	.0026	2	15.9	9.55
Outer Panel Lift Wire	5/16	154	.334	.0026	2	17.3	10.4
Outer Panel Landing Wire	3/16	154	.2	.0026	2	10.4	3.9
Inner Strut	2.64	96	1.76	.0004	2	14.1	31.0
Outer Strut	1.98	96	1.32	.0004	2	10.5	17.5
Inner Upper K-Bar	7/8	56	.34	.0004	2	2.7	1.7
Inner Lower K-Bar	1 1/2	56	.583	.0004	2	4.7	5.2
Outer Upper K-Bar	5/8	56	.243	.0004	2	1.9	1.7
Outer Lower K-Bar	1 3/8	56	.535	.0004	2	4.3	6.4
						97.2	106.45

RESISTANCE AND WEIGHT OF DOUBLE LIFT TRUSS SYSTEM

Member	Size"	Length"	Area Sq. Ft.	Kx	No.	Rx #	Wt. #
Rear Inner Panel Lift Wire	1/2	131	.455	.0026	2	23.6	17.7
Rear Inner Panel Landing Wire	5/16	131	.284		2	14.8	8.8
Rear Outer Panel Lift Wire	5/16	147	.318		2	16.5	9.9
Rear Outer Panel Landing Wire	3/16	147	.191		2	9.9	3.72
Front Inner Panel Lift Wire	7/16	131	.398		2	20.7	13.7
Front Inner Panel Landing Wire	1/4	131	.228		2	11.8	6.5
Front Outer Panel Lift Wire	1/4	147	.256		2	13.3	7.3
Front Outer Panel Landing Wire	1/8	147	.128		2	6.6	2.4
Inner Panel Inner Wire	1/4	95	.166		4	17.3	9.1
Outer Panel Inner Wire	3/32	95	.124		4	12.9	1.8
Rear Inner Strut	2.42	84	1.41	.0004	2	11.3	22.8
Rear Outer Strut	1.74	84	1.01	.0004	2	8.1	11.8
Front Inner Strut	2.29	84	1.33	.0004	2	10.6	20.5
Front Outer Strut	1.64	84	.96	.0004	2	7.6	10.5
						185.0	146.57

The K-bar Truss reduces interference by eliminating interplane struts and wires and also by affording increased Gap cord ratio.

Normal C. P. near central wing bar, only light forces at most rearward C. P.


MOST FORWARD C.P.
NORMAL C.P. AT 2°
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DRIFT WIRE FROM LEADING EDGE BAR TO REAR WING BAR
TURNING THIS BAR ALTERS INCIDENCE OF UPPER PLANE
AEROFOIL-OFENSTEIN I SCALE
3 FEET
FORCES EQUAL AND OPPOSITE NO BENDING MOMENT IN STRUT
TURNING THIS BAR ALTERS INCIDENCE OF LOW PLANE

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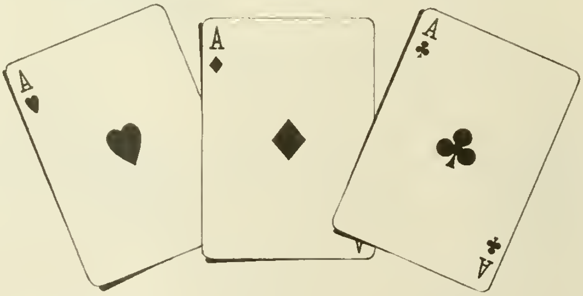

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(*Continued from page* 1255)

the the Italian Royal Air Force have been awarded the Italian War Cross:
Major:

Florello H. La Guardia

First Lieutenants:
James L. Bahl (deceased)
Raymond P. Baldwin
Arthur M. Beach
Allen W. Bevin
Gilbert P. Bogert
Arthur F. Clement
William C. Cochran
De Witt Coleman. Jr (deceased)
Kenneth G. Collins
Alexander M. Craig
Herbert C. Dobbs, Jr.
Edmund A. Donnan
Norton Downs, Jr.
Arthur D. Farquhar
Harry S. Finkenstaedt
Willis Fitch
Donald G. Frost
William O. Frost
Gosta N. Johnson
James P. Hanley, Jr.
George C. Hering
Wallace Hoggson
LeRoy D. Kiley
Herman F. Kreuger
Paton MacGilvary
Ohle Mitchell
William H. Pottchoff
Aubrey G. Russell
William Shelton
Norman Sweetser
Emory E. Watchorn
Frederick F. Weyerhaeuser
Warren Wheeler
Alfred S. R. Wilson
Warren S. Wilson

Second Lieutenants:
Spencer L. Hart
James Kenedy
Norman Terry

Italian Citations

The following American Officers, First Lieutenants, attached to the Italian Air Service have been mentioned in citations:

James P. Hanley, Jr.
George C. Hering
William B. Shelton
Norman Sweetser
Emory E. Watchorn
Frederick K. Weyerhaeuser

Where Divisions Are Located Overseas

Washington, January 23rd.—The War Department made public a list giving the latest location of all divisions in France, as follows:

1—Montabaur, Major Gen. E. F. McGlachlin.
2—Heddesdorf, Major Gen. John A. Lejeune.
3—Andernach, Major Gen. Robert L. Howze.
4—Bertrich, Major Gen. Mark L. Hersey.
5—Esch sur Alzette, Major Gen. Hanson E. Ely.
6—Aigny-le-Duc, Major Gen. Walter H. Gordon.
7—Euvezin, Major Gen. Edmund Whittemeyer.
26—Montigny-le-Roi, Major Gen. Harry C. Hale.
27—(On priority,) Montfort, Major Gen. John F. O'Ryan.
28—Hudicourt, Major Gen. William H. Hay.
29—Bourbonne les Baines, Major Gen. Charles G. Morton.
30—(On priority,) Balloon, Major Gen. Edward H. Lewis.
31—Skeletonized, part on priority, part sailed.
32—Rengsdorf, Major Gen. Wm. Lassiter.
33—Diekirch, Major Gen. George Bell, Jr.
34—Skeletonized, part on priority, part sailed.
35—Commercy, Major Gen. Thomas B. Dugan.
36—Cheny, Major Gen. W. R. Smith.
37—(On priority,) Wormhoudt, (to Le Mans,) Major Gen. Charles B. Fansworth.
38—Skeletonized, part on priority.
42—Ahrweiler, Major Gen. Clement A. F. Flagler.
77—Chateau Villian, Major Gen. Robert Alexander.
78—Semur, Major Gen. James H. McRae.
79—Souilly, Major Gen. Joseph E. Kuhn.
80—Ancy-le-Franc, Major Gen. Samuel D. Sturgis.
81—Mussy sur Seine, Major Gen. Charles J. Bailey.
82—Prauthoy, Major Gen. George B. Duncan.
84—(To be skeletonized at Le Mans, Nov. 28.)
86—(Skeletonized—part for replacement, part to return to United States.)
87—St. Nazaire, Brig. Gen. William F. Martin.
88—Laigny, Major Gen. William Weigel.
89—Kylburg, Brig. Gen. Frank L. Winn
90—Berncastel, Brig. Gen. Joseph P. O'Neill.
91—(Designated for Lafaret—Bernard—to early return, Le Mans,) Major Gen. M. H. Johnston.
92—Le Mans, Brig. Gen. James B. Erwin.

Depot Divisions

41—St. Aignan, Brig. Gen. Eli Cole, U. S. M. C.
83—Le Mans, Major Gen. E. T. Glenn.
85—Toul, Major Gen. Chase W. Kennedy.
39—(Skeletonized for replacement and return to the United States.)
40—Revigny, Major Gen. F. S. Strong.
8—Pons.

Advanced Ratings for Overseas Officers for Distinguished Service

Advanced flying ratings have been recommended to 20 officers of the Air Service who have distinguished themselves in action overseas. Among the officers so recognized are Lieut. Col. Wm. Thaw, Major David McK. Peterson, Capt. Edward V. Rickenbacker, Capt. Reed G. Landis, Capt. Douglas Campbell, Capt. Edward G. Tobin, and Lieut. L. O. Donaldson, all credited with having shot down five or more planes.

These ratings are the first awards issued by a Board formed under the direction of Major General Wm. L. Kenly, Director of Military Aeronautics, to pass upon the qualifications and merits of flying officers who have distinguished themselves in action, with a view to awarding them such ratings as their achievements and abilities may warrant. This Board is composed of Col. Townsend F. Dodd, Lieut. Col. B. F. Castle, Major Horace M. Hickam, and First Lieut. Sidney T. Thomas, of the Army Air Service.

The ratings awarded are those of the Junior Military Aviator, carrying an increase of 50% base pay for flying duty, and the Military Aviator carrying 75% increased pay. Before the war the rating of Junior Military Aviator was given after certain flying tests were passed and that of Military Aviator only after three years' experience as a Junior Military Aviator. During the war the rating of Reserve Military Aviator was created, and a law was passed which authorizes the promotion and appointment of officers to advanced ratings for distinguished service in action without examination. The operations in the United States are now vested in the above mentioned board.

There follows a list of 20 officers just recommended by the board for these ratings, six of whom are reported deceased. The ratings are indicated by the letters J.M.A., Junior Military Aviator, and M.A., Military Aviator, the second being the senior rating.

Lieut. Col. Wm. Thaw, M.A., Pittsburg, Pa.; Maj. David McK. Peterson, M.A., Honesdale, Pa.; Capts. Edward V. Rickenbacker, J.M.A., to M.A., Columbus, O.; Reed G. Landis, M.A., Chicago, Ill.; Douglas Campbell, M.A. Mt. Hamilton, Calif.; Edgar G. Tobin; J.M.A., San Antonio, Texas; First Lieuts. Louis G. Bernheimer, J.M.A., New York, N. Y.; Wm. P. Erwin, J.M.A., to M.A., Chicago, Ill.; Robert F. Raymond, J.M.A., Newton Center, Mass.; Donald B. Warner (Bomber), to J.M.A., Swampscott, Mass.; James A. Keating, J.M.A., to M.A., Chicago, Ill.; Second Lieuts. Earl W. Porter (Observer), J.M.A., Chicago. Ill.; John O. Donaldson, M.A., Washington, D. C., and Charles W.

(*Continued on page* 1285)

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THE LIBERTY STARTER

THE Liberty Starter is a four cylinder racial two cycle air motor and compressor with a bore of 2¼" and stroke of 2¼". As a starter it has 9 to 1 gear reduction on final drive to motor. It pumps direct drive at engine speed.

The valve construction is a semi-rotary of the Corliss type, having universal joint action to rocker shaft. The driving member between the rocker shaft and the valve not only performs the function of a universal joint, but is so constructed that the air pressure in valve chamber presses it against the end of rocker shaft bearing sealing the chamber airtight. It also permits the valve to be floated and held against the seat by the air pressure. This entirely eliminates the use of troublesome soft packing where valve actions are used.

The crank shaft is carried on roller bearings. All parts are idle except when brought into action as a pump or a starter.

The Liberty Starter has been approved and is being used by the United States Navy. The Japanese government recently placed an order for a large number.

The usual attachment on such as the Liberty, Hall-Scott, Renault and Bugatti motors is by bolting direct the flange of starter to the flange on motor. A suitable flexible coupling is provided for the drive to the crank shaft. Where flanges are not provided, such as the Curtiss V.X., etc., arms are provided for supporting the starter on engine runners.

Although it weighs but 30 pounds completely the Liberty Starter is capable of starting the largest engines in service, such as the Liberty, Hall-Scott, Renault, Bugatti, etc. Its compactness lends itself to the requirements of installation on aeroplanes where but little space is available for "accessories" of any kind; though the "Liberty" can hardly be termed an accessory for it has really become a necessity.

Its length is only 8". It cranks the engine at 150 R.P.M. or more, and it replenishes its own energy in half a minute. The tank, weighs 12¼ lbs., bringing the total weight of the outfit to 49 lbs.

After the engine is started, the Liberty starter automatically disengages and remains disengaged until it is needed again either as a starter or compressor.

When the air pressure in the tank becomes low, the compressor is put in operation by pressing a button on the control valve while the engine is running at low speed. When engaged, the engine must be run at from 1200 to 1400 R.P.M., and when the pressure has been brought up to 230 lbs., the mechanism automatically becomes disengaged.

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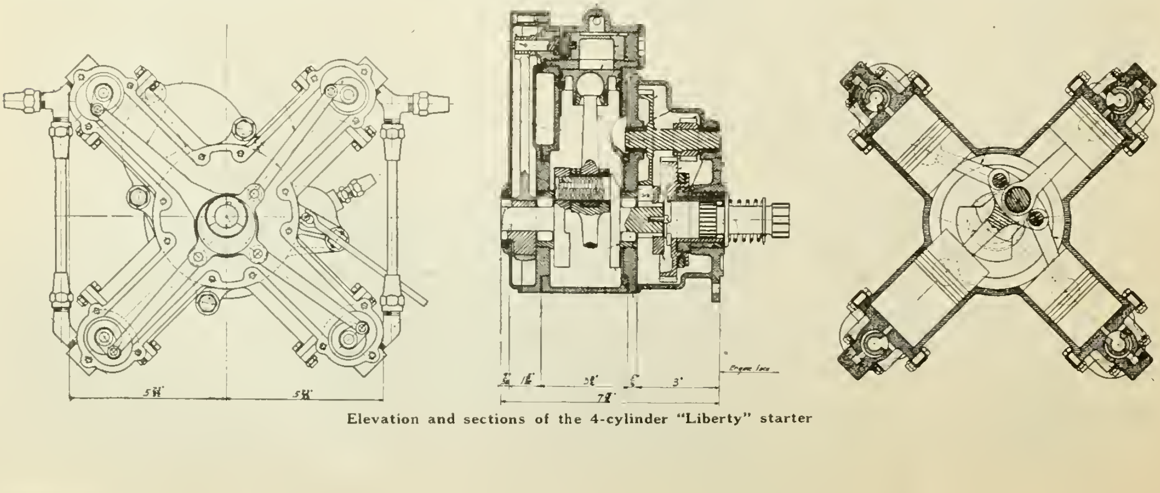

Elevation and sections of the 4-cylinder "Liberty" starter

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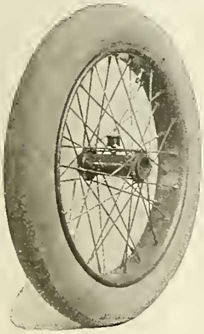

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(*Continued from page* 1251)

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Breaker gap..................................0.020 in.
Spark plugs....................Splitdorf (Le Rhone Special)
Gap ....0.020 to 0.024 in.
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Director of engine rotation. Normal (counter clockwise from propeller end.)
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Fuel recommended, 60° to 72° Baumé (0.740 to 0.690 sp. gray.)
Oil consumption..1 1/3 gal. per hr. or 0.12 lb. per b. h. p. hr.
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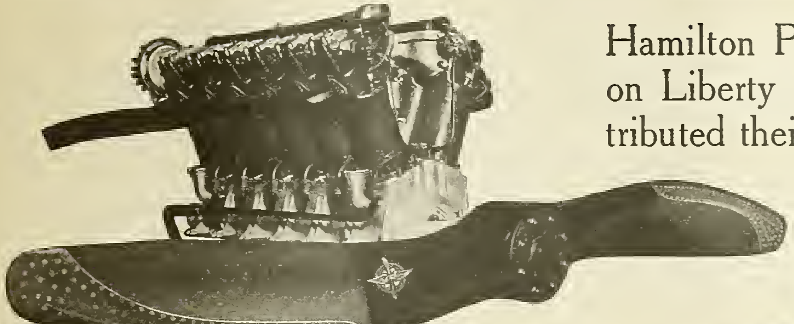

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The following deceased officers have also been recommended: First Lieuts. Fred W. Norton, J.M.A., Columbus, Ohio.; Edward Orr, J.M.A., Chicago, Ill.; Merton L. Campbell, M.A., Wakeman, Ohio, and Lloyd A. Hamilton, M.A., Burlington, Vt. Second Lieuts. Frank B. Bellows, J.M.A., Wilmette, Ill., and Roger Hitchcock, J.M.A., Los Angeles, Calif.

Cited for Distinguished Service

The commander-in-chief, in the name of the President, has awarded the distinguished service cross to the following named officers and soldiers for the acts of extraordinary heroism described after their names:

First Lieut. William P. Frank, observer (Air Service), 20th Aero Squadron, first day bombardment group. For extraordinary heroism in action near Buzancy, France, October 23, 1918. While flying in the rear of a formation, returning from a bombing raid, Lieut. Frank's machine was attacked by three hostile planes, Fokker type. Lieut. Frank was wounded and rendered unconscious early in the encounter, but upon recovering he shot down a Fokker which was attacking the leader of the formation and drove off two others which were pressing him from the side. Home address, Paul A. Frank, brother, 2349 Michigan Avenue, Chicago, Ill.

First Lieut. Andre P. Gundelach ,deceased (Air Service), pilot, 96th Aero Squadron. For extraordinary heroism in action near Buxieres, France, September 12, 1918. Lieut. Gundelach, with Second Lieut. Pennington H. Way, observer, volunteered for a hazardous mission to bomb concentrations of enemy troops. They successfully bombed their objective, but while returning were attacked by eight enemy planes. Their plane was brought down in flames and both officers killed. Next of kin, Maj. C. D. Meyer, Q. M. C., 5802 Kenmore Avenue, Chicago, Ill.

Second Lieut. Pennington H. Way, deceased (Air Service), observer, 96th Aero Squadron. For extraordinary heroism in action near Buxieres, France, September 12, 1918. Lieut. Way with First Lieut. Gundelach, pilot, volunteered for a hazardous mission to bomb concentrations of enemy troops. They successfully bombed their objective, but while returning were attacked by eight -enemy planes. Their plane was brought down in flames and both officers killed. Next of kin, Mrs. Pennington H. Way, wife, St. Davids, Pa.

First Lieut. Richard D. Shelby, Air Service, 139th Aero Squadron. For extraordinary heroism in action near Verdun, France, October 10, 1918. Lieut. Shelby encountered six enemy planes at a very low altitude strafing our trenches. He immediately attacked and dispersed the enemy planes and by skilful manœuvring brought one of the planes down just behind his own lines. Home address, W. A. Shelby, father, Rosedale, Miss.

First Lieut. Karl J. Schoen, deceased (Air Service), 139th Aero Squadron. For extraordinary heroism in action near Aincreville, France, October 1, 1918. While leading a patrol of three machines Lieut. Schoen sighted nine enemy planes, Fokker type, and immediately attacked them. Although greatly outnumbered, he destroyed one of the planes and put the others to flight. He was killed in action October 29 and has been officially credited with destroying seven enemy aircraft. Next of kin, Maruine Estelle Schoen, wife, 5001 College Avenue, Indianapolis, Ind.

(*Continued from page* 1272)

order after the splicing is that of gluing up the veneer to form a "panel" or "plywood." The "finish" or outside "plies" of panel that have just come from the splicer are not put through the gluer. Only the inner layers or "cross-hands" pass through this machine, which applies the glue to both surfaces of the wood. As a "cross-hand" comes from the gluer it is laid upon a sheet of finish veneer. When the panel is only three ply another layer of finish is next placed upon the "core" or cross-hand, with its grain at right angles to the grain of the core, and parallel to that of the first finish ply. If, however, the panel is to be of five-ply construction, a relatively thick core or "center," usually of chestnut, gum or poplar, and often of comparatively poor quality, is laid upon the first cross-band, on top of this comes another cross-band, and lastly the outside finish ply. Veneer used for cross-banding is generally the cheaper, rotary cut gum or poplar. Since it can be obtained in any width, splicing is unnecessary. Panels, of course, may consist of any number of plies. Symmetry requires that the number be odd. Always, the grain of adjacent plies is at right angles.

Pressing the Panels.—The glued panels are now placed in piles upon a "caull," a thick, rigid board of laminated construction. Between each layer of plywood is inserted a thin waxed board. When the piles are 3½ or 4 feet high another caull is put on the top and the whole then placed in a hydraulic press. But instead of resting directly on the bed of the press the lower caull rests upon several shallow I-beams placed crosswise of the bed. The same number of I-beams are similarly put on top of the upper caull. The I-beams project beyond the sides of the pile and heavy turn-buckle clamps are attached to corresponding ends above and below. The purpose of these clamps is not to aid in applying the load, but as the pile compresses or packs down slightly, due air and surplus glue being squeezed out, the slack in the clamps is taken up, and therefore, when the stack is removed from the press, it is still under great pressure caused by tension in the clamps.

The pressure while the stack is in the press depends upon the character of the panels; that is, their size and thickness, and the species of wood of which they are made. For lighter work 100 pounds per square inch is satisfactory, but for the largest, heaviest type, a pressure of 300 pounds per square inch is needed. Excessive compression causes the glue to squeeze out between the joints and results in a "starved" joint. The operation of pressing takes only about five minutes.

After removal from the press, the stack of panels, tightly clamped together, is carried to a drying room. Here it remains as a rule for 24 hours in a temperature of 70 to 90 degrees Fahrenheit. When this time has elapsed the clamps are loosened, the upper caull removed. and the panels piled up in the same room, separated by small sticks so that they are entirely exposed to the dry-air kept circulating through the room. Forty-eight hours is allowed for this second drying, after which the panels are ready for cutting to size and sanding.

Cutting and Sanding.—This operation is done with rip and cross-cut saws which trim the panels to the specified dimensions. They are now ready for the final process, that of smoothing the surfaces in a sanding machine. The panels are drawn in by steel rolls and passed over sand-paper of grades ranging from No. 1½ to No. 0. Ordinarily this is sufficient, although sometimes a panel has to be put through the sander a second time. For very fine work a "finish sanding" on a belt re-sander with No. 00 paper is required. Whenever plywood is designed to carry important stresses care must be taken, especially if the face plies are thin, not to remove too much material in the sanding process in order, for instance, to reach a specified total thickness.

Minor defects that occasionally appear in finishing work, caused, perhaps, by slight imperfections in the wood or careless workmanship, are repaired by an expert, who generally cuts out the part containing the flaw and inlays new wood.

(The writer wishes to express his appreciation to the Messrs. Kline of the Louisville Veneer Mills, Louisville. Ky., for their kind assistance in securing the material for this article.)

(*Continued from page* 1261)

15,000 feet and an increase of two and a half percent in the horizontal speed was obtained by removing the nose radiator, streamlining the nose and fitting on side radiators.

Wind tunnel tests on a large model have indicated that for a given amount of heat dissipated, the total head resistance of the fuselage is from ten to fifty percent greater when fitted with a nose radiator than when a free air radiator is used, the larger difference having occurred when the same type of cooling section was used in both cases, and the smallest difference having occurred when a high resistance radiator was in the nose.

There remains still one point in favor of the nose radiator: When it is shuttered the head resistance of the machine decreases, whereas the shuttering of a free air radiator increases the resistance of the machine. But this point may be practically dispensed with at once. An aeroplane, which in constructed in such a way that a nose radiator can be installed on it, is usually of such a design as will permit the use of retractable radiators—side radiators which can be drawn into the fuselage, or a radiator underneath the fuselage which can be drawn up into it.

The Wing Radiator

There is at the present an increasing tendency towards the installation of the radiator in the wing; but it does not seem advisable to adopt this location as being exceptionally good without a rather extensive study of its effects. A great number of influences are brought to bear upon the machine which are difficult of solution and should probably be determined from comparative tests in flight.

In connection with the ordinary radiator installation head resistance weight, durability, cooling properties and the ability of pass water are the main considerations; and these are all easily determined in the wind—tunnel and in flight. But the wind radiator brings in its own head resistance (perhaps more aptly called "drag" in this case) weight, durability, loss of lift, increased wing loading, increased angle of incidence, the consequent increase in resistance of the wings, cooling properties and the ability to pass water—and the problem of determining whether it is a good installation becomes more complicated.

From comparative tests in flight on a honeycomb wing radiator, shown in Fig. 15, it is safe to say that this particular type is very bad when installed in the wing.

In this case the horizontal speed of the seaplane was reduced by four and a half percent at one thousand feet, and the rate of climb was reduced by sixteen percent in the first three thousand feet of climb, as compared with the performance of the same machine when equipped with ordinary radiators.

On the basis of these tests the following discussion is given as being the probabilities concerning the wing radiator, as compared with the usual type.

The weight of the radiator wil probably be fifteen percent greater. Assuming a speed of ninety miles per hour, this increase in size suggests that the cooling power of the radiator will be that of a free air radiator at seventy-two miles per hour, and indicates that the resistance to the air in passing through the radiator is 6.3 pounds per square foot. As the tubes in the radiator in question were placed at thirty degrees to the vertical this resistance may be resolved into a vertical component of 5.45 pounds per square foot and a horizontal component of 3.15 pounds per square foot. Then, assuming a normal wing loading of 8 pounds per square foot there will be a loss of lift of [(8 — 5.45) lb. /sq. ft. =] 2.55 pounds per square foot of the surface occupied by the radiator. Now taking the weight of the radiator itself at its normal value of 19.2 pounds per square foot and adding on the loss of lift, we have the effective weight as

$$(19.2 + 2.55) \text{ lb. /sq. ft.} = 21.75 \text{ lb. /sq. ft.}$$

and assuming a lift-drift ratio of six, the power to carry the radiator is

$$(3.15 \times 6 + 21.75) \times .04 \text{ h.p. /sq. ft.} = 1.63 \text{ h.p. /sq. ft.}$$

and taking the heat dissipation per 100°F. mean difference at its normal value of 72 miles per hour we have

$$\text{Figure of merit} = \frac{40.6}{1.63} = 24.9$$

which is extremely high, as the figure of merit of a free air radiator at ninety miles per hour is in the neighborhood of thirteen.

Up to this point the efficiency of the radiator itself as calculated is high; and the higher efficiency has been obtained by procuring a low air speed, as in the case of the nose radiator, and by converting part of the resistance into a vertical component. But it seems probable that a very heavy drag which cannot be calculated is brought into play in changing the direction of the air flow before it enters the radiator and after it leaves it. If the very poor performance of the machine in question is actually due to such a drag, it might be said off-hand that the use of a plate radiator in which the plates ran parallel to the length of the machine would do away with most this injurious effect by allowing the air to flow through the radiator with a very small change in direction.

It is not believed that the air would flow through in such a way, however, because the high pressure underneath the wing acting in connection with the low pressure above the wing should tend to change the direction of the air and force it upward through the radiator. And, furthermore, if the use of a plate radiator would allow the air to flow through with a small charge in direction, a very small amount of air would get through, as the cross-sectional area of the air stream which flowed into the radiator would approximate the projected area (projected along the line of flight) of the wing radiator, and this would be very small. Furthermore, under such conditions the air would flow along the lengths of the plates and would become very ineffective toward the rear becase of its being heated up.

At present any consideration of the wing radiator must of necessity be largely conjectural; and it must remain for further and extensive tests to determine whether it can be made efficient or not. It may be possible to make a longitudinal plate radiator with such a small plate spacing that the loss of lift will be very small; but it is believed that the effect illustrated in Fig. 4 will nulify the cooling properties of the radiator before the desired small spacing is reached. And it is believed that the injurious effect of this type which has been ascribed to a drag entailed in changing the direction of the air which passes through the radiator cannot be disposed of.

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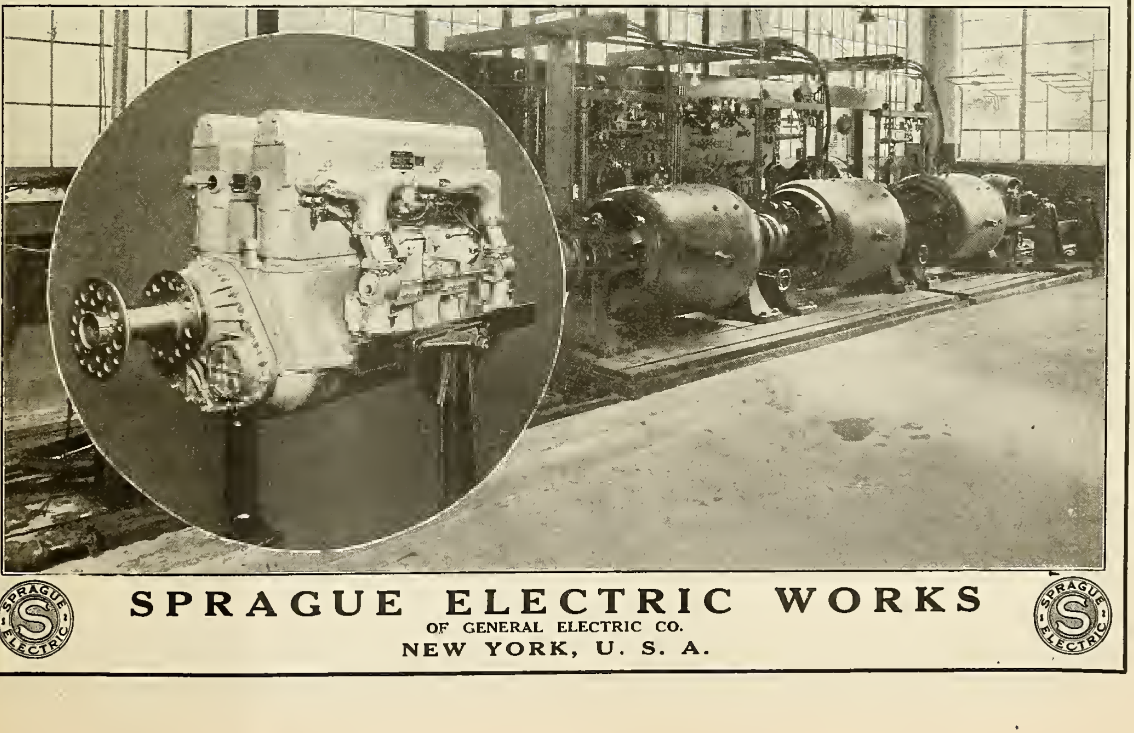

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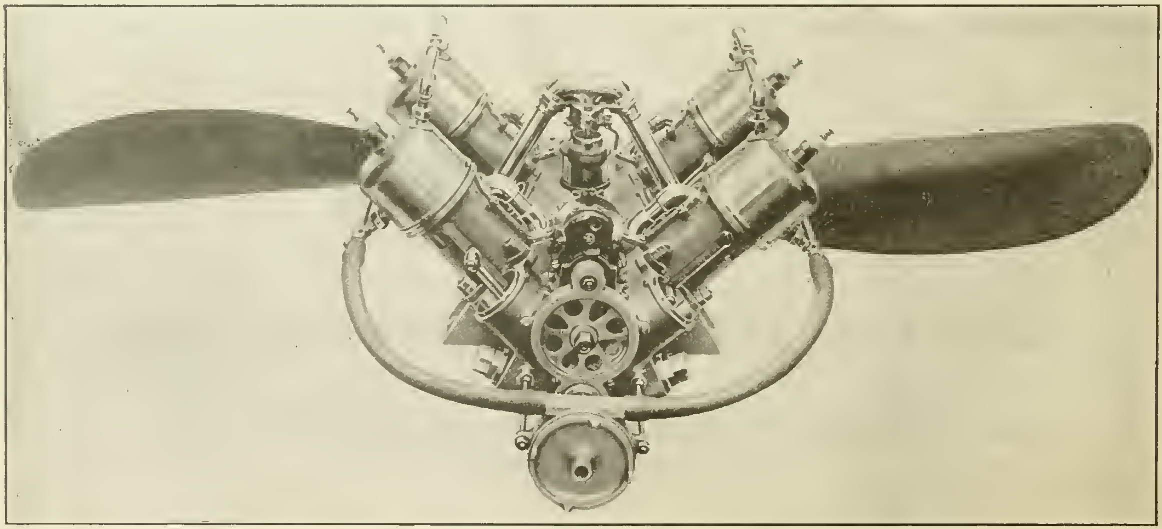

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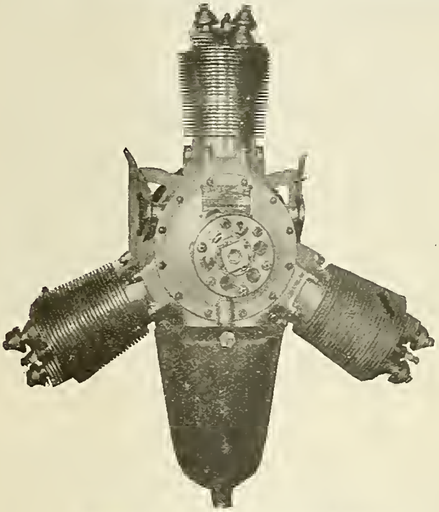

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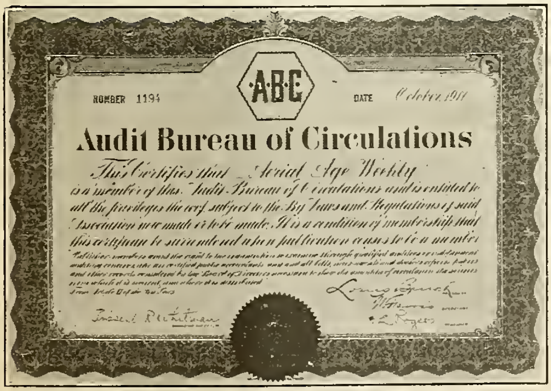

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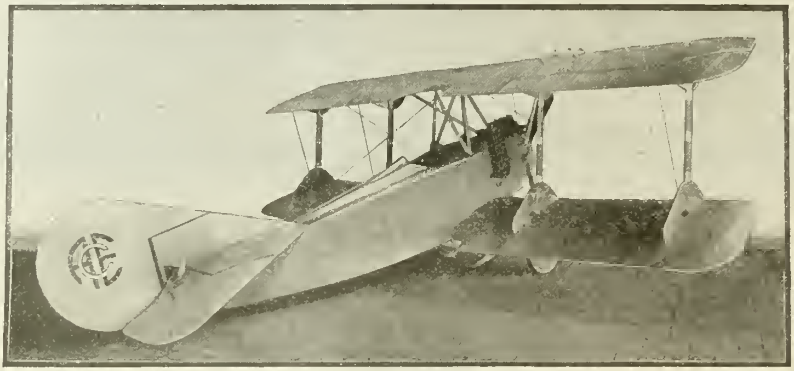

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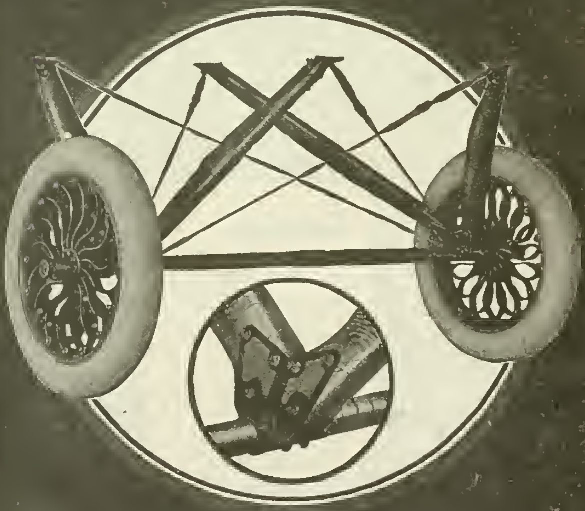

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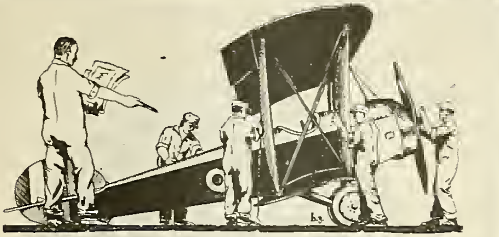

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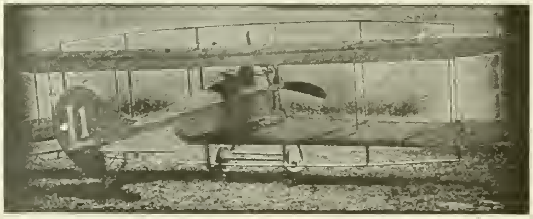

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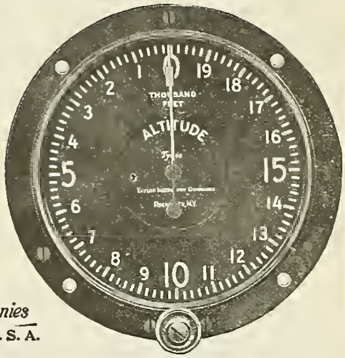

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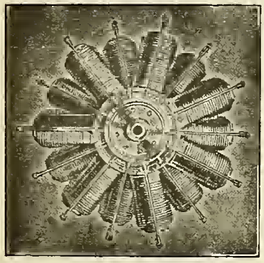

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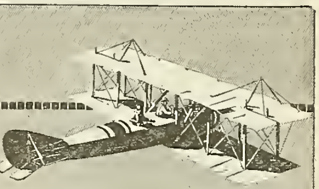

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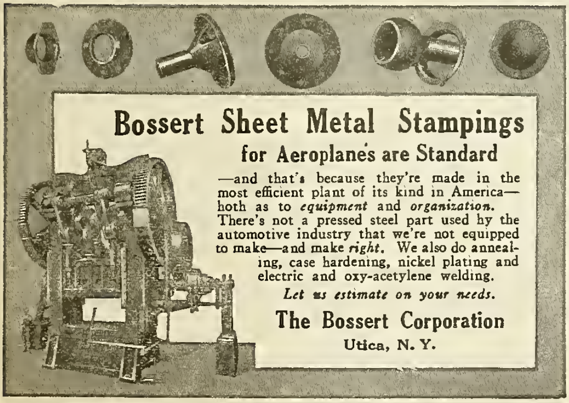

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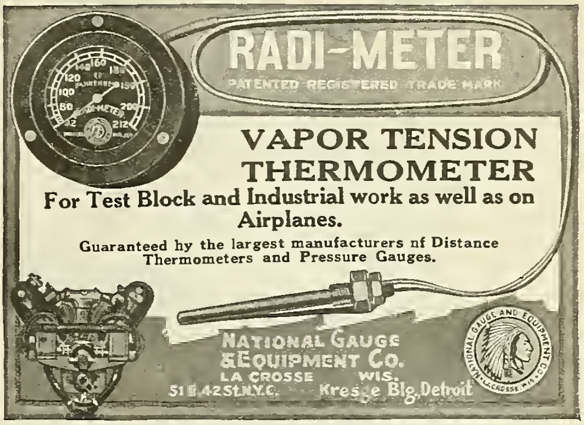

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FOR AERONAUTICAL USE
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Ask Any Old Time Flyer
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Classified Advertising

Forms close for this department on Monday preceding date of issue

BUILD THAT NEW AEROPLANE now for the coming flying season. Get Catalogue L propeller and motor from America's oldest aeronautical supply house. 12c. stamps. Heath Aeroplane Co., Chicago, Illinois.

MODELS—Model Aeroplanes, Accessories, and Supplies. Materials suitable for the construction of models that will fly. Send 5 cents for illustrated catalog. Wading River Manufacturing Company, 672 Broadway, Brooklyn, N. Y.

POSITION OPEN for a good pilot who can loop and who has his own machine. Exhibition work entirely, covering New England and Middle West. Communicate with J. Howard Bushway, 398 School St., Watertown, Mass.

WANTED one six cylinder Anzani motor, 60 H.P., 1913 or 1914 model. State best price and where can be seen. Address H. L. Worley, Room 1800 Times Bldg., New York, N. Y.

FOR SALE: Propelling Turning Lathe, Drill Press, Arbor Press, Balancing Stands, Clamps, Benches, etc., in excellent condition for propeller manufacturer. For full list apply Box 322, Aerial Age, 280 Madison Avenue, New York, N. Y.

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FORD-MOTORED AEROPLANE PARTS sets complete with instructions. Save hundreds of dollars by doing your own assembling. Patterson Aeroplane Co., Dept. F., Detroit, Michigan.

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CHICAGO AERO WORKS, 326 River St. Special Drawings, Engineering Data, Calculations, for intending aeroplane builders. Stock Drawings for amateur builders and students, $2.00 each. Rathbun's Textbook, $2.00.

HOW TO TIME AEROPLANE, Automobile, Motorcycle, Marine, and Stationary Motors, from one to any number cylinders correct, simple, more simplified method known to the engineering world. If you can read English, you can time a motor. Postpaid One Dollar. Dept. 1, H. T. Jordan, 421 Hoyt Street, Buffalo, N. Y.

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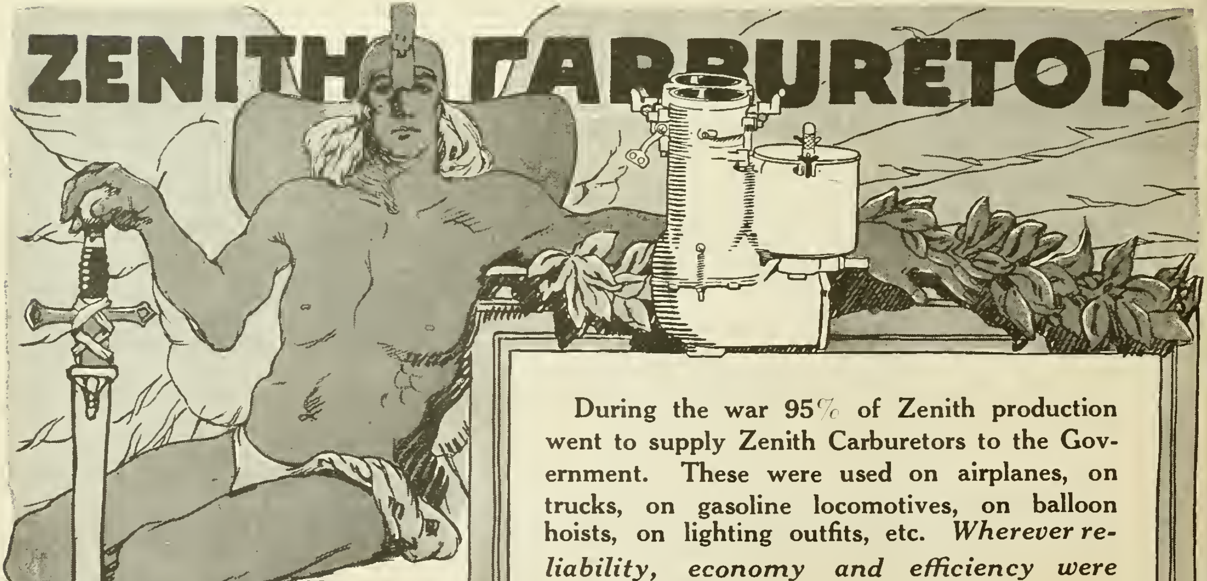
At present we are engaged exclusively on Government work. Other orders can, however, be accepted now for delivery after the war.



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During the war 95% of Zenith production went to supply Zenith Carburetors to the Government. These were used on airplanes, on trucks, on gasoline locomotives, on balloon hoists, on lighting outfits, etc. *Wherever reliability, economy and efficiency were needed Zenith Caburetors were found.*

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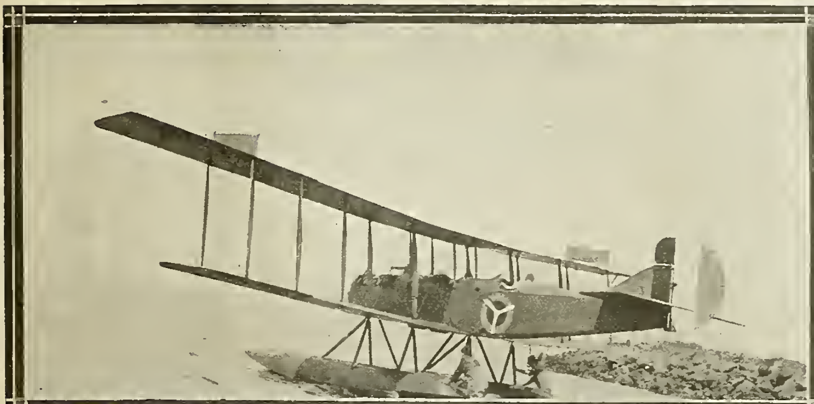
(There are two Zenith Liberty Carburetors used on every Liberty Aircraft Engine produced—the reason is clear to Zenith users.)



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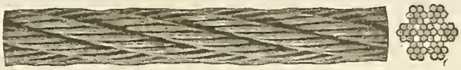

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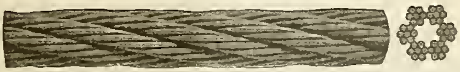

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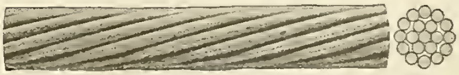

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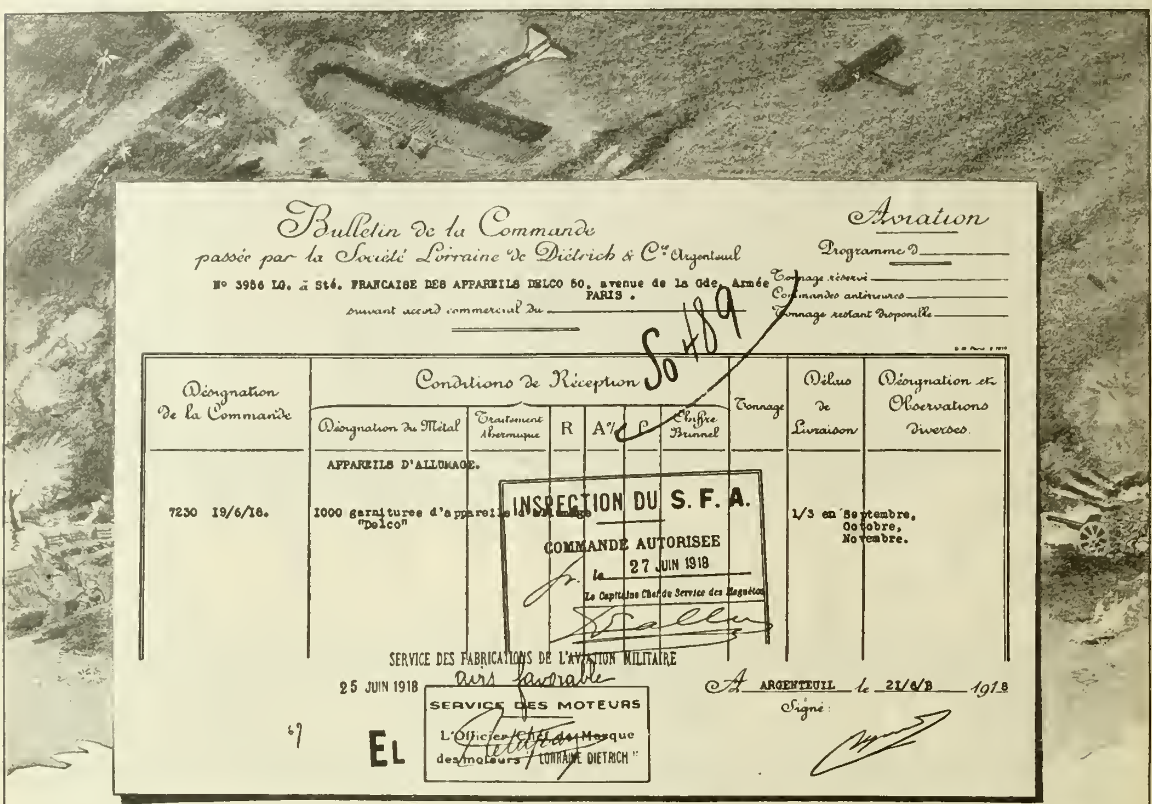

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INSPECTION DU S. F. A.
COMMANDE AUTORISEE
le 27 JUIN 1918
Le Capitaine Chef de Service des Magnétos

SERVICE DES FABRICATIONS DE L'AVIATION MILITAIRE
25 JUIN 1918 avis favorable

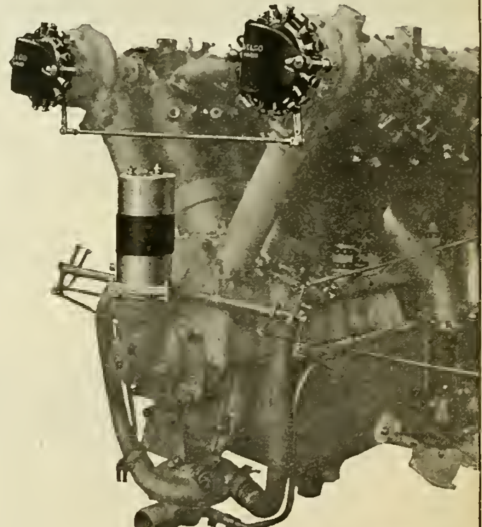
SERVICE DES MOTEURS
L'Officier Chef du Marque des moteurs "LORRAINE DIETRICH"

A ARGENTEUIL le 21/6/18 1918
Signé:

67

EL

Photograph of order issued by the Lorraine-Dietrich Company, countersigned by the French Government, Department of Motors and the Division of Magnetos requiring delivery of 1,000 Delco Ignition Systems to supplant standard magneto equipment on the latest French aeroplane motors.

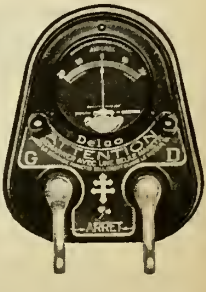


Such an order was quite unprecedented in Europe of course—but War cannot respect custom nor play favorites. It always demands the fittest and best. So as the war went on, our Veteran Allies, taking their cue from the performance of American battle planes, *also* recognized the supremacy of Delco Ignition for the strenuous airplane service.

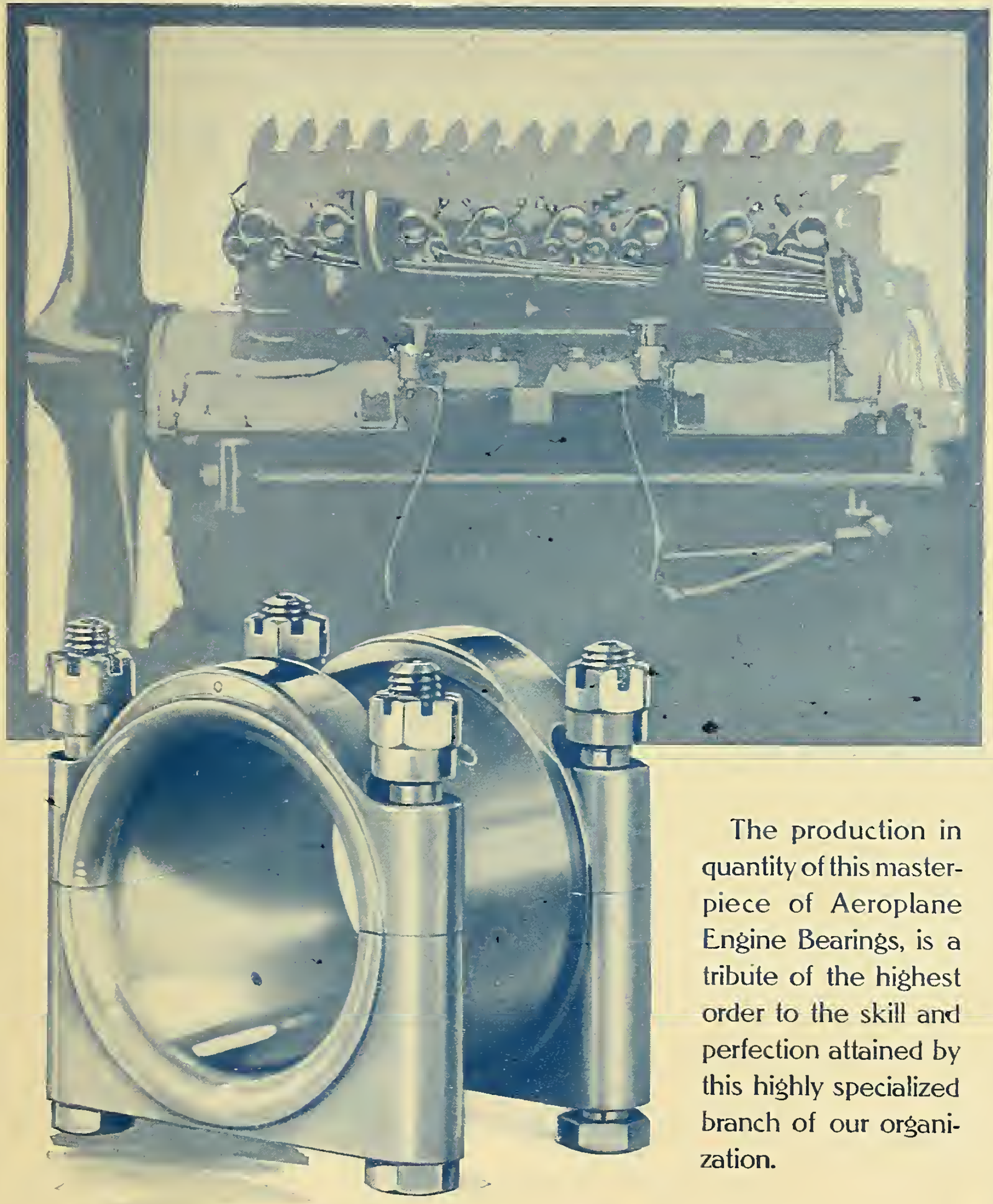
The Dayton Engineering
Laboratories Company
Dayton, Ohio U. S. A.

Above: Delco installation on Lorraine-Dietrich motor.

Right: Delco switch used with this type of ignition.



Delco



The production in quantity of this masterpiece of Aeroplane Engine Bearings, is a tribute of the highest order to the skill and perfection attained by this highly specialized branch of our organization.

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Where the man with a bearing problem is apt to come

LIKE all manufacturing plants, Hess-Bright has its daily callers. Not alone those who come to sell it maintenance materials or improvements or other service—but another class—potential buyers with a mechanical problem to solve.

To these latter, and there are scores of them, Hess-Bright does not signify alone a workshop flanked by offices, drafting room and test bench. But inclusive of these it takes on a new merit: As a constructive force living for and in the interest of better bearings.

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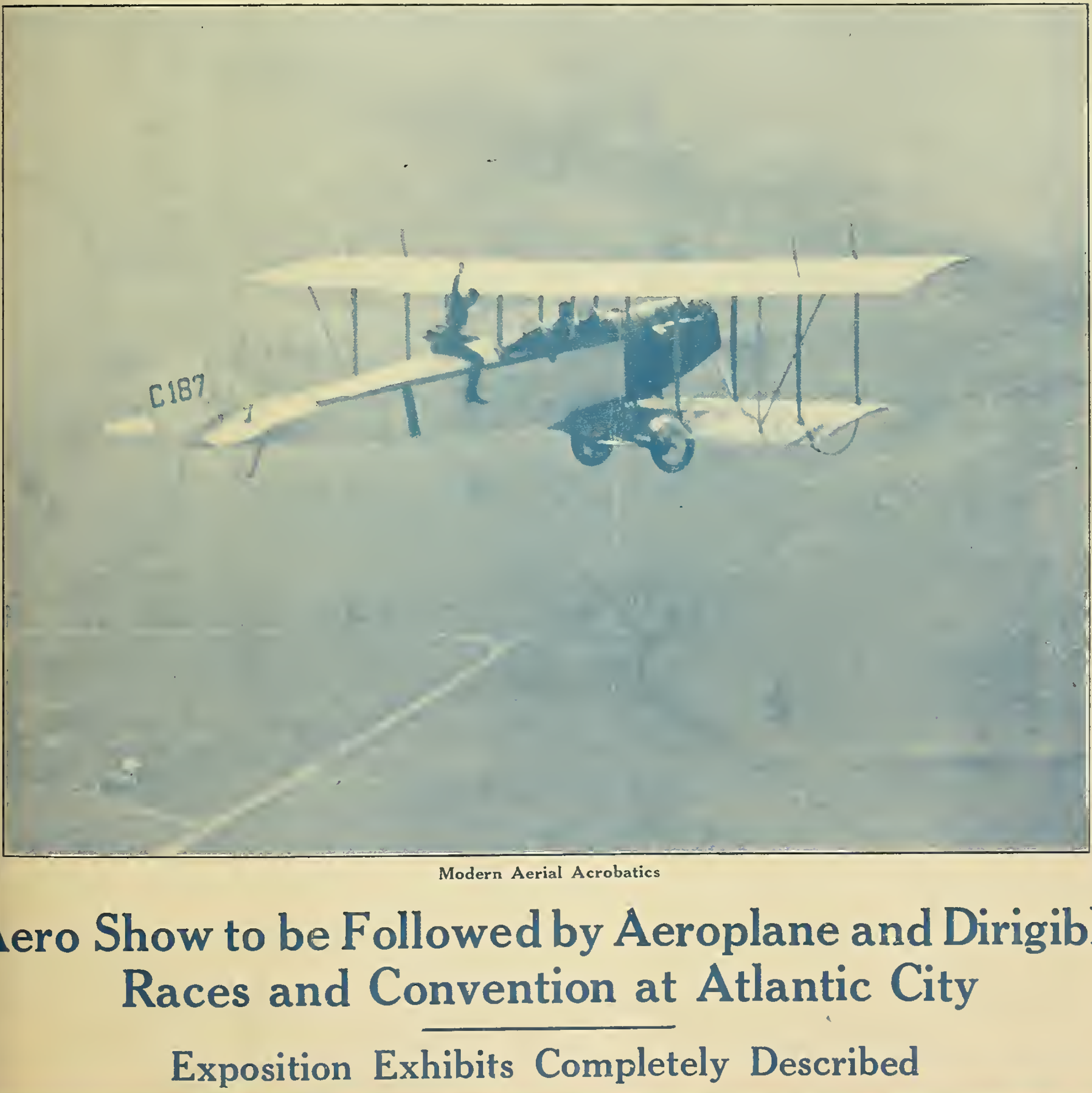
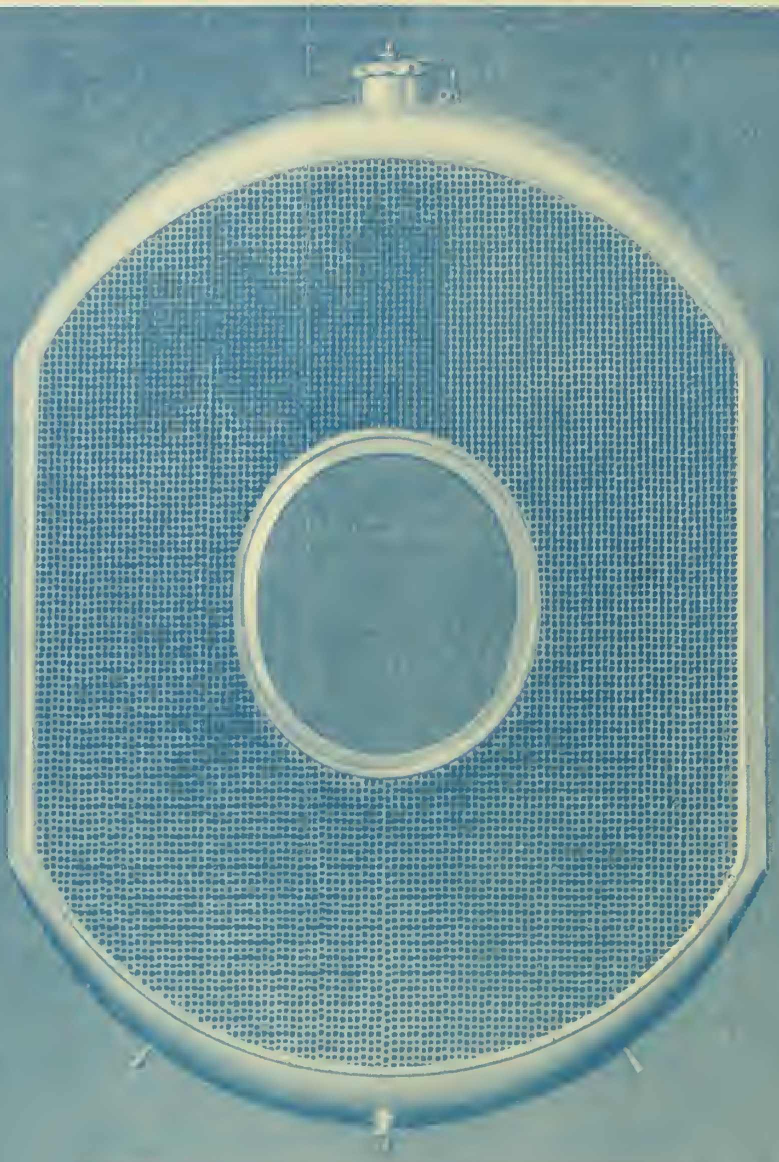


Modern Aerial Acrobatics

Aero Show to be Followed by Aeroplane and Dirigible Races and Convention at Atlantic City

Exposition Exhibits Completely Described

SHED WEEKLY BY THE AERIAL AGE COMPANY, INC., FOSTER BUILDING, MADISON AVENUE AND FORTIETH STREET, NEW YORK CITY
Domestic, $4. Foreign, $6. Entered as second-class matter March 25, 1915, at the Post Office at New York, under the act of March 3rd, 1879



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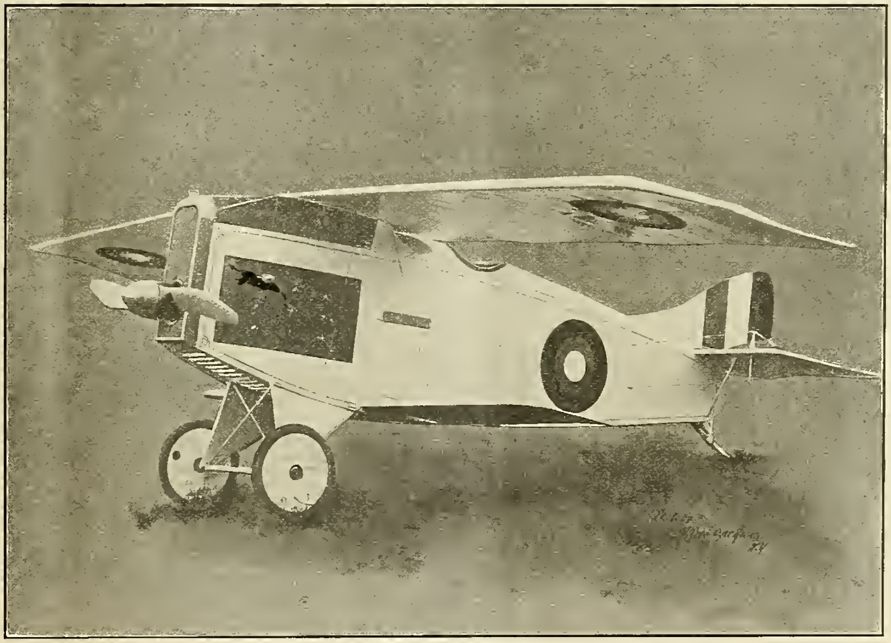
ON DISPLAY AT THE

AERONAUTICAL EXPOSITION

MARCH 1st to 15th, 1919
MADISON SQUARE GARDEN



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The First Flexible Wing Aeroplane

SPEED OVER 180 MILES P. H. MOTOR 185 H. P. 6 CYLINDER

Maximum Speed, Maximum Lift, Minimum Horse Power

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First commercial manufacturer of aeronautical motors in the United States.

First manufacturer of Dirigible Cars in the United States.

Invented and perfected the Hydroaeroplane.

Invented and perfected the Flying Boat.

Designed and built the OX-5 Motor—the international training motor.

Originated the famous JN-4D machine — the international training-plane.

Supplied aeronautical motors, flying-boats, aeroplanes, hydroaeroplanes for United States, Great Britain, Italy, Denmark, Russia, Norway, Sweden, Brazil and the Argentine Republic.

Published and distributed first handbooks on aeronautical motors and aeroplanes.

Furnished instructors and instruction-data for all ground-schools and flying-fields.

Ninety-five per cent of American and Canadian aviators trained in Curtiss machines during the war.

Produced more aeroplanes than any other aeroplane factory in the world.

Largest number of commercial flying-schools in the world.

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Sales Office
52 Vanderbilt Ave.
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Achievements

In collaboration with Naval constructors, designed and built the largest flying boats in the world—Models T, N.C.-1 and H-16-A.

Designed and built the fastest hydroaeroplane—Model H-A.
Designed and built the fastest land-machine—Model 18-T.

Navy Air Service of the United States was 95% Curtiss design.

Designed and built the lightest high-powered twelve-cylinder "V"-type motor—the Curtiss K-12.

Invented and built first flying aerial limousine—the Curtiss "Autoplane."

Designed and built the only flying life-boat.

Designed and built the only flying fire-boat.

Largest and most modern aeroplane factories in the world.

Largest commercial Aeronautical Research Department.

Largest privately-owned wind-tunnel in the world.

Largest number of internationally-known Aeronautical Engineers on staff.

Most modern aeronautical manufacturing plants in the world.

Produced more airplanes than all other United States Manufacturers combined.

Curtiss Engineering Corporation
Garden City, Long Island

The Burgess Company
Marblehead, Mass.

Maximum Service

- in -

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Our fully-equipped organization enables us to handle *quantity orders* for *special parts* promptly and efficiently. We have recently furnished the CURTISS AEROPLANE COMPANY with 100,000 parts.

Let us send you detailed information

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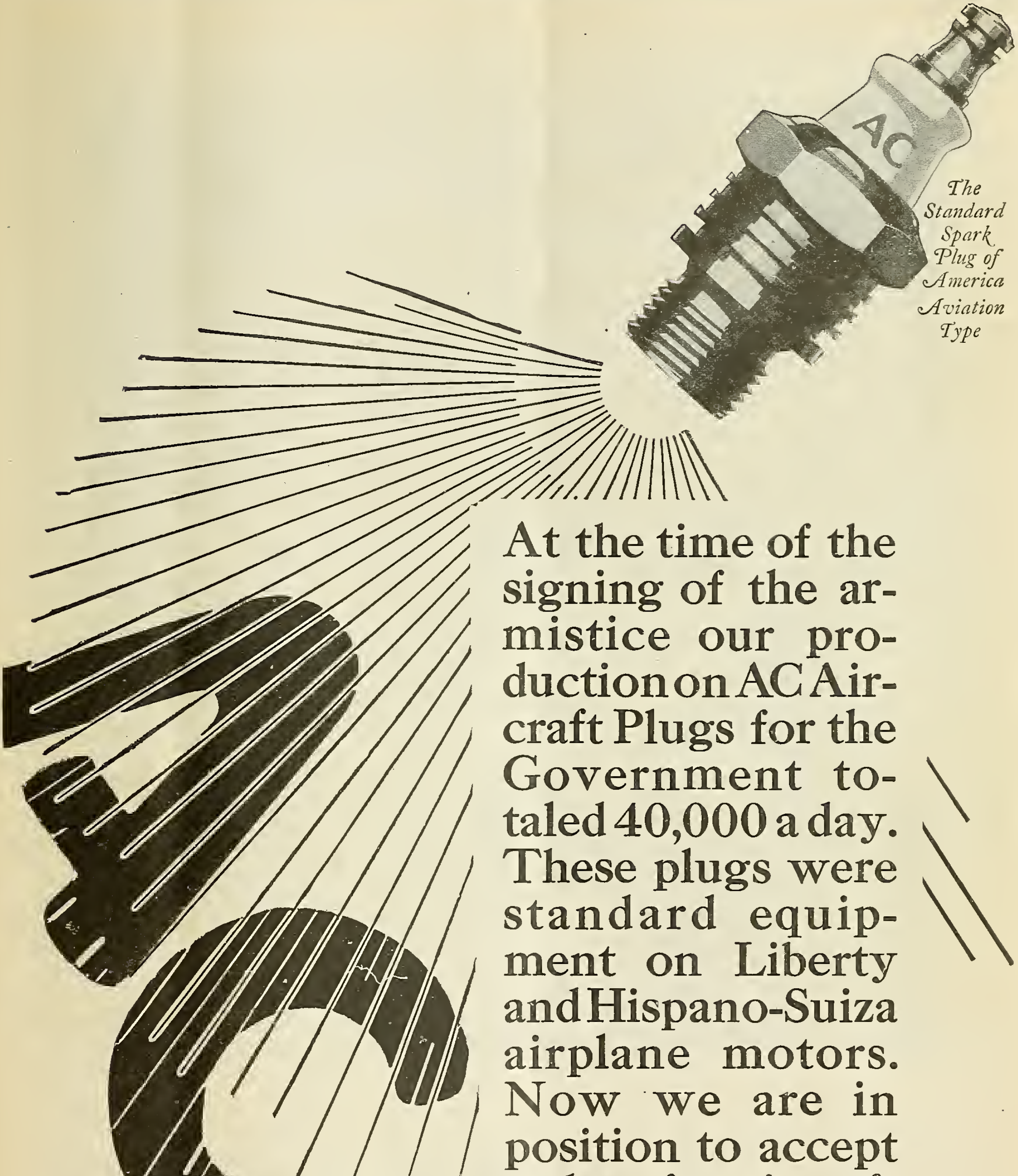

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At the time of the signing of the armistice our production on AC Aircraft Plugs for the Government totaled 40,000 a day. These plugs were standard equipment on Liberty and Hispano-Suiza airplane motors. Now we are in position to accept orders for aircraft plugs from private manufacturers.

Champion Ignition Company
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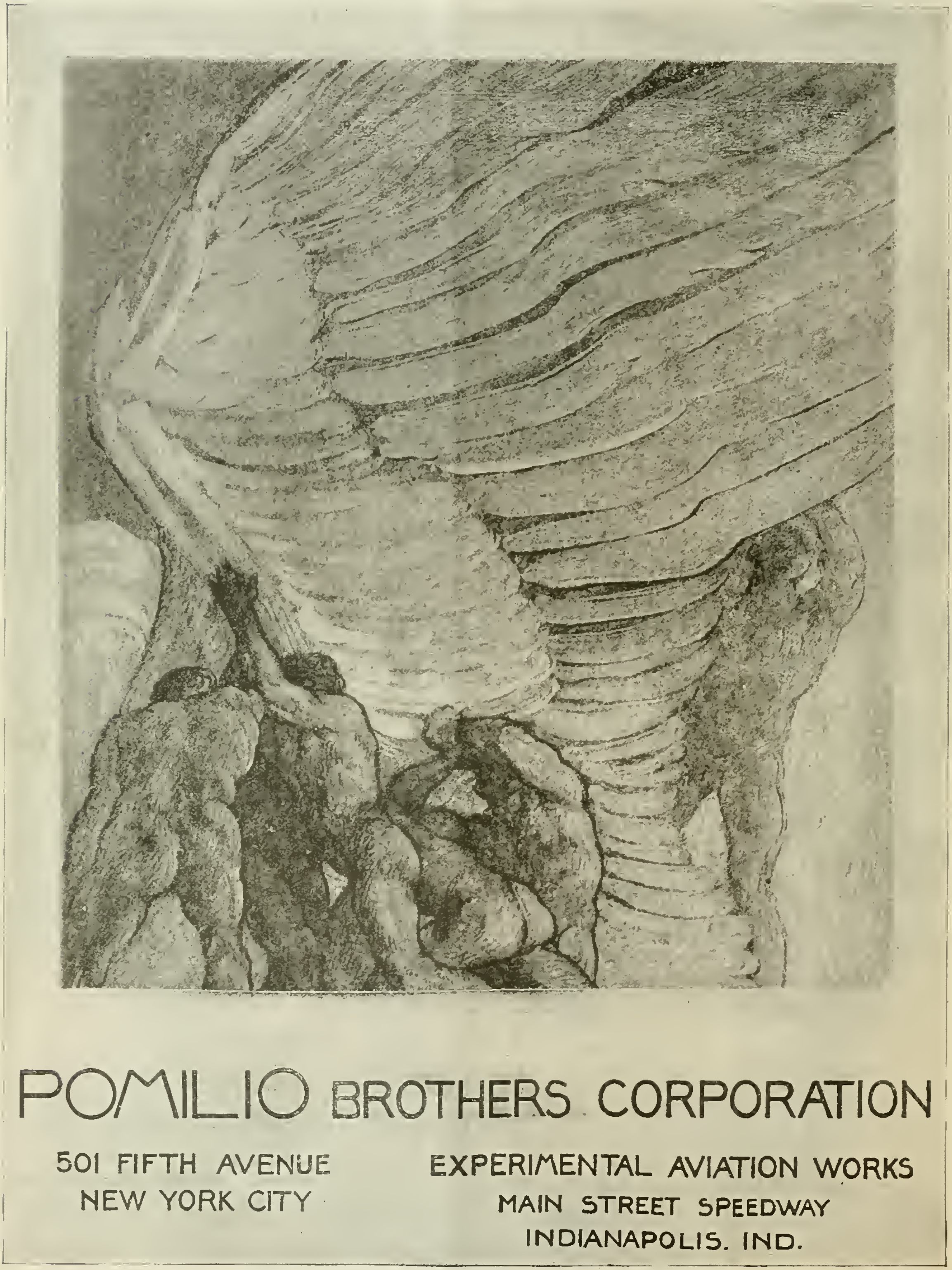
U. S. Pat. No. 1,135,727, April 13, 1915. U. S. Pat. No. 1.216,139, Feb 13. 1917. Other Patents Pending



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EXPERIMENTAL AVIATION WORKS
MAIN STREET SPEEDWAY
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ENDURANCE RECORD

Established by Union Airplane Motor at U. S. Aeronautical Testing Laboratory, Navy Yard, Washington, D. C.

Best previous record exceeded by fifty per cent.

UNION GAS ENGINE CO.
Established 1885
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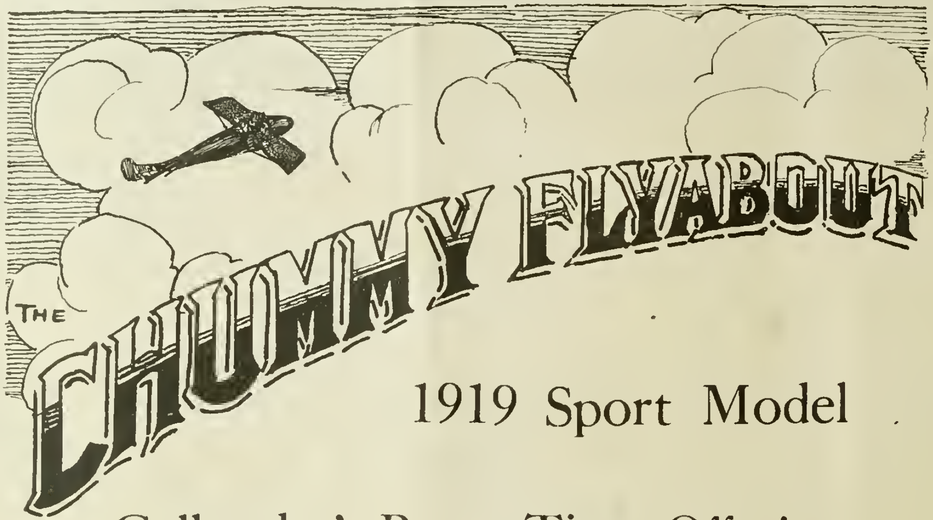
AT THE SHOW



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Gallaudet's Peace Time Offering to the World of Outdoor Sport

A dependable flying machine designed by experienced aeronautical engineers.

High factor of safety.

Low cost of maintenance.

Sold with or without instructions in flying.

See this little Pleasure Craft at the Aeronautical Exposition, Madison Square Garden, March 1st to 15th, in Space No. 1, or write for literature giving account of recent actual performances.

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Manufacturers for the United States Government

The Dayton Wright Airplane Co.

DAYTON, OHIO

"The Birthplace of the Airplane"

WE BELIEVE in the future of aircraft in the United States. As an evidence of this belief we are exhibiting at the Aeronautical Show in New York City two Packard aircraft engines—an eight and a twelve—also a new type of plane designed by Packard engineers.

These products, as yet, are not on the market. Our purpose at this time is to do our part, along with others, in giving to the public a true picture of what the near future has in store. By so doing, we turn into useful channels the results of experience gained in producing planes and engines for war.

Packard Motor Car Company · Detroit

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"NORMA"
PRECISION
BALL BEARINGS
(PATENTED)

The right perspective on values reveals serviceability as the big out-standing essential today. And any analysis of airplane serviceability shows a most complex division of responsibility among a hundred smaller units that, in themselves, are seemingly insignificant. Weakness in any one of them weakens the structure upon which dependability rests.

"NORMA" Ball Bearings—small, and hidden away in ignition apparatus and radio-electric apparatus—are the standards with the builders of high-grade electrical apparatus because their superlative speed qualities and high factor of safety in speed service are known to give maximum security against bearing trouble—which means maximum security against ignition trouble.

Be SURE. See that your Electrical Apparatus is "NORMA" Equipped.

THE NORMA COMPANY OF AMERICA
1790 BROADWAY NEW YORK
Ball, Roller, Thrust, Combination Bearings

"NORMA" PATENTED

AERIAL AGE
WEEKLY

VOL. VIII MARCH 10, 1919 No. 26

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Air Service Demobilization

Commercial Aerial Transportation Concerns will find it to their advantage to write to

The Aerial Register

(To appear shortly under the auspices of AERIAL AGE WEEKLY)

For NAMES and QUALIFICATIONS of

Pilots
Meteorologists
Aerial Navigators
Aerial Surveyors
Aerodrome Managers
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Aerial Traffic Managers
Aircraft Inspectors
Wireless Experts
Instructors
Airship Pilots
Rigging Specialists
Aerial Statisticians
Equipment Experts

And for INFORMATION CONCERNING COMMERCIAL AERONAUTICS IN ANY PART OF THE WORLD

If YOU hold any of the above qualifications, but have not yet registered, you are invited to communicate with the Editor (Air Service Demobilization Department) AT ONCE.

280 MADISON AVE., NEW YORK

SECOND PAN-AMERICAN AERONAUTIC CONVENTION AND EXHIBITION

To Be Held Under the Auspices of The Aero Club of America, The Aerial League of America and the Pan-American Aeronautic Federation.

From Thursday, May 1st, 1919,
to
June 1st, inclusive,
at
Atlantic City, N. J.

CONTESTS TO BE HELD EACH SATURDAY

(1) Seaplane Contests (general),
(2) Curtiss Marine Flying Trophy and Prizes,
(3) Intercollegiate Seaplane Contests,
(4) Land Aeroplane Contests,
(5) Dirigible Contests,
(6) Kite Balloon Speed in Ascending and Descending, and Maneuvering Contests,
(7) Parachute Competition,
(8) Aviette (bicycles and motorcycles with wings) Contests.

EVERY DAY ACTIVITIES

(1) Exhibits of Aeroplanes, Motors and Accessories on the Steel Pier,
(2) Demonstrations and tests of Seaplanes, Land Aeroplanes, Motors, Dirigibles, Kite Balloons, to prospective purchasers and representatives of different governments,
(3) Aerial Passenger Carrying by seaplanes and dirigibles, and kite balloon ascensions,
(4) Moving pictures and Addresses by leading authorities on most important phases of aeronautics.

The Governments and Aeronautic, Sporting, Scientific, Industrial and Civic organizations of the United States and all the countries in the world, excepting Germany and her allies, are invited to send representatives to attend this great aeronautic event. On arrival in the United States these representatives should call at the Headquarters of the Convention Committee at No. 297 Madison Avenue, New York City, to register and receive their official badges and the official program.

In the event that it is more convenient for them to go directly to Atlantic City they will register at the offices of the Convention located at the following Atlantic City hotels: Hotel Traymore, Hotel Chalfonte, The Breakers Hotel, Hotel St. Charles, Hotel Marlborough-Blenheim, Hotel Chelsea, Hotel Alamac, Hotel Dennis and Hotel Haddon Hall.

Representatives of the Convention Committee will be at the Bureaus of the Aeronautic Convention at the above-named hotels and will issue the official badges which admit the bearer to the Aeronautic Hall, as well as the Aero Exhibition on the Steel Pier, the judges' enclosure during contests, and to the Aerodrome and seaplane stations where the aircraft and motors will be demonstrated.

All communications until May 1st, should be addressed to Rear Admiral Peary, Chairman, Aeronautic Convention, Aero Club of America, 297 Madison Avenue, New York City.

DAILY PROGRAM FOR PAN-AMERICAN AERONAUTIC CONVENTION, EXHIBITION AND CONTESTS

THURSDAY, MAY 1ST

Opening of Convention and Exhibit.

AFTERNOON—Reception at Aeronautic Hall on the Steel Pier. Addresses by United States Government State and aeronautic authorities.

EVENING—Aero Show and addresses by officials.

FRIDAY, MAY 2ND

AFTERNOON—Aero Show. Preliminary tests of seaplanes, dirigibles and kite balloons.

EVENING—Moving pictures and address on flying for sport and pleasure.

SATURDAY, MAY 3RD

AFTERNOON—Seaplane and dirigible races, and kite balloon ascending and descending contest.

EVENING—Ball.

SUNDAY, MAY 4TH

MORNING—Memorial service by eminent Divine for the dead airmen.

AFTERNOON AND EVENING—Reception to allied aces and heroes of the air and their parents, and announcement of the award of the Aero Club of America Medal of Valor, and the Aerial League of America Diploma of Honor.

MONDAY, MAY 5TH

AFTERNOON—First parachute contest for $500 Bennett Prize.

EVENING—"The Large Dirigible and Its Value for Transportation." Representatives of railroads, express, steamship and other transportation organizations invited to attend.

TUESDAY, MAY 6TH

AFTERNOON—Illustrated addresses on "Aerial Forest Patrol." Forestry Department of every State invited.

EVENING—"Work of Aerial Police Squadrons, and Why Every City Should Have One."

WEDNESDAY, MAY 7TH

AFTERNOON AND EVENING—Aerial Mail Day. Illustrated address on, and consideration of, "Aerial Mail Planes." Chairman of Post Office and Post Roads Committees of House of Representatives and Senate, and Postmaster General Burleson invited to deliver addresses. (26,000 United States Postmasters, and Chambers of Commerce of 13,000 cities invited to attend.)

THURSDAY, MAY 8TH

AFTERNOON AND EVENING—Illustrated addresses on the "Need of Municipal Aerodromes, and the Part to be Played by Aircraft in City Planning." Chambers of Commerce and City Planning Commissions of 13,000 cities invited to attend.

FRIDAY, MAY 9TH

AFTERNOON—Arrival of seaplanes and army planes from Army and Navy Air Stations. Second parachute competition for the $500 Bennett Prize.

EVENING—Illustrated addresses on "Latest Developments in Aerial Warfare and Adventures in Aerial Warfare," told by famous aces.

SATURDAY, MAY 10TH

AFTERNOON—Army, Navy and Marine Corps Day. Aerial contests and tournament.

EVENING—United State's Army and Navy Officers' Reception. Reception and addresses at Aeronautic Exhibition Hall on the Steel Pier.

SUNDAY, MAY 11TH

AFTERNOON AND EVENING—Presentation of the flags by each State of the United States to the Aero Squadrons representing the States. Each State will present a flag to each Aero Squadron, the members of which were overwhelmingly natives of that State. The presentation will be made by representatives from the State and the Aero Club and Aerial League branch of that State. All States and cities invited to send delegates, and Army, Navy and Marine Corps to send representatives.

MONDAY, MAY 12TH

AFTERNOON—Demonstrations and illustrated addresses on the "Value of Aircraft for Advertising by Day and by Night." All national advertisers and advertising agents invited to attend.

EVENING—"Pan-American Aerial Transport Over Land." Addresses by members of the commissions of the 20 Latin-American Republics.

TUESDAY, MAY 13TH

AFTERNOON AND EVENING—"Pan-American Aerial Transport Over Water." Addresses by members of the 20 Latin-American Republics' Commissions.

WEDNESDAY AND THURSDAY, MAY 14TH AND 15TH

AFTERNOONS AND EVENINGS—"The Airways and Aerial Transport in Europe, Canada, Africa, Australia and Asia."

FRIDAY, MAY 16TH

AFTERNOON AND EVENING—"Aerial Navigation Instruments for Flying Over Land and Water." Aviators, navigators, scientific instrument makers and aeronautic experts invited.

SATURDAY, MAY 17TH

AFTERNOON—Aerial races and contests. Illustrated addresses on Aerial Photography.

EVENING—Extensive exhibit of aerial photographs and photographic apparatus. All photographers, professional and amateur, and makers of photographic apparatus invited.

SUNDAY, MAY 18TH

AFTERNOON AND EVENING—Illustrated addresses on "Aerial Exploration and the Use of Aircraft for Coast and Geodetic Survey."

MONDAY, MAY 19TH

AFTERNOON—Addresses on "Need of Broader Attitude Regarding Insurance for Aircraft and Aviators."

EVENING—Illustrated address on "How Army Medical Standards and Inspection Lessen Accidents." Insurance companies and agents invited.

TUESDAY, MAY 20TH

AFTERNOON AND EVENING—Illustrated addresses showing different ways of crossing Atlantic by air and the problems to be solved to accomplish same successfully.

WEDNESDAY, MAY 21ST

AFTERNOON—Aero Safety Day. Discussion of aero safety provisions made; improvements in aeroplane construction; increased reliability of aero motors; devices which make for safety in flying.

EVENING—"Progress Made in the Art of Piloting Aeroplanes." Illustrated.

THURSDAY, MAY 22nd

AFTERNOON AND EVENING—Addresses and discussions of meteorology—"How the Weather Forecasts Can be Extended and Made More Efficient by the Use of Aircraft in Exploring the Upper Air," also "How the Weather Forecasts Help Aerial Navigation," and "Telegraphic and Climatic Factors in Relation to Aeronautics.

FRIDAY, MAY 23RD

AFTERNOON AND EVENING—Addresses on "Aerial Jurisprudence—Aerial Laws and Regulation of Air Traffic." (First day.) Lawyers, traffic commissioners and police authorities of different countries invited.

SATURDAY, MAY 24TH

AFTERNOON—Races and contests.

EVENING—Illustrated address on "Need of Establishing Altitude Levels for International, Interstate and Interurban Air Travel."

SUNDAY, MAY 25TH

AFTERNOON AND EVENING—Aeronautic Art Day. Address on "Aerial Painting and Sculpture of Different Countries, and Exhibition of Aerial Paintings," by Lieut. Farre, Lieut. Ruttan and others. All prominent artists, managers of art galleries and art patrons invited to attend.

ENGINEERING WEEK.

MONDAY, MAY 26TH

AFTERNOON—"Aeronautic Engineering Problems and Their Prospective Solution."

EVENING—Opening of contests for designs and ideas for large aeroplanes.

TUESDAY, MAY 27TH

AFTERNOON—"Factors That Increase the Efficiency for Large Dirigibles."

EVENING—"Advantages of Veneer and Plywood for Aircraft Construction."

WEDNESDAY, MAY 28TH

AFTERNOON—Address on "Problems of Flying at 35,000 Feet and Over, and Their Prospective Solution."

EVENING—"Present Day Aero Engines."

THURSDAY, MAY 29TH

AFTERNOON—"Flying Boats Versus Hydroaeroplanes for Sport and Transportation."

EVENING—Contest for designs and ideas for large aeroplanes.

FRIDAY, MAY 30TH (Memorial Day)

AFTERNOON—Dirigible races, kite balloon speed ascending contest; parachute contest.

EVENING—Reception at the Aeronautic Hall, Steel Pier.

SATURDAY, MAY 31ST

AFTERNOON—Seaplanes, land planes and dirigible contests. Aviette competition at which all cyclists and makers of bicycles and motorcycles will be invited.

EVENING—"International Medical Standards for Aviators in War and Peace." Reports from different countries illustrated with attractive films. 50,000 medical men invited.

SUNDAY, JUNE 1ST

AFTERNOON AND EVENING—Award of prizes and diplomas for all events.

PROGRAMME

Deuxième Convention et Exposition Aeronautique Pan-Américaine
Sous les auspices de l' "Aero Club of America," "The Aerial League of America," et la "Pan-American Aeronautic Federation."
Du Jeudi 1 Mai, 1919 au 1 Juin, inclus. à Atlantic City, N. J.

CONCOURS DEVANT ETRE TENUS CHAQUE SAMEDI.

1. Concours d'hydravions.
2. Trophées et Prix Curtiss pour Aviation Navale.
3. Concours Intercollegiaux pour Hydravions.
4. Concours d'Avions.
5. Concours de Dirigeables.
6. Concours de rapidité d'ascension, de descente et de manoeuvre pour ballons captifs.
7. Concours de Parachutes.
8. Aviettes (bicyclettes et motocyclettes munies de voiles).

EPREUVES QUOTIDIENNES.

1. Exposition d'Avions, Moteurs et Accessoires sur la jetée d'acier.
2. Demonstration et essais d'hydravions, avions, moteurs, dirigeables, ballons captifs, aux acheteurs eventuels.
3. Transport de passagers par bydravions et dirigeables, et ascensions en ballons captifs.
4. Representations cinématograpbiques et conférences sur les phases les plus importantes de aéronautique suivant le programme ci-dessous:—

JEUDI, LER JOUR

Ouverture de la Convention et Exposition.

Après-midi—Réception au Hall de l'Aéronautique sur la jetée d'acier: Discours par des autorités du Gouvernement.

Soir—Des Etats-Unis, et l'Etat et de l'Aeronautique Exposition aeronautique et discours par des personnages officiels.

VENDREDI, 2EME JOUR

Après-midi—Exposition aeronautique. Essais préliminaires. D'hydravions, dirigeables et ballons captifs.

Soir—Représentation cinématographique et conférences sur l'aviation en tant que sport, et agrément.

SAMEDI, 3IEME JOUR

Après-midi—Courses d'hydravions et dirigeables, et concours d'ascension et de descente pour ballons captifs.

Soir—Bal.

DIMANCHE, 4IEME JOUR

Matin—Service pour la mémoire des aviateurs morts.

Après-midi, et soirée—Réception des As Alliés et Héros de l'air et de leur familles. Remise de la Médaille de Valeur de l'Aero Club d'Amérique et du diplome d'Honneur de la Ligue Aérienne d'Amérique.

LUNDI, 5IEME JOUR

Après-midi—Premier concours de Parachutes pour le Prix Bennett de $500.00.

Soir—Le grand dirigeable et sa valeur au point de vue transport. Les représentants des Compagnies de chemin de fer, d'Express, de Navigation et autres organisations de transports, sont invités à y assister.

MARDI, 6IEME JOUR

Après-midi—Conférences, accompagnées de projections sur la surveillance aérienne des forets. (Les membres du département forestier de chaque Etat sont invités).

Soir—Le rôle des escadrilles de police aérienne, et pourquoi chaque ville devrait en posséder.

MERCREDI, 7IEME JOUR

Après-midi—Journée de la poste aérienne. Conférences avec projections; considérations sur les avions postaux. Le Président du Comité des bureaux de poste et des voies postales au Sénat et à la chambre, et le Directeur Général des Postes, Burleson, sont invités à prononcer des discours. (26000 Directeur des Postes des Etats-Unis et des représentants des Chambres de Commerce de 13,000 villes y sont invités.)

JEUDI, 8IEME JOUR

Après-midi et soir—Discours avec projections sur la nécessité d'Aerodromes municipaux, et la part qui sera joué par l'aviation dans le "City Planning". (Les chambres de commerce et les commissions de City-planning" de 13000 villes sont invités.)

VENDREDI, 9IEME JOUR

Après-midi—Arrivée d'avions et hydravions militaires de leurs différents centres. Deuxième concours de Parachutes pour le prix Bennett de 500 dollars.

Soir—Conférences avec projections par des As célèbres, sur les derniers développements de la guerre aérienne et sur leurs aventures personneles.

SAMEDI, 10IEME JOUR

Après-midi—Journée, de la Marine et des fusillers marins. Concours aériens.

Soir—Réception d'officiers de l'Armée et de la Marine Américaine. Réception et discours au hall de l'Exposition Aeronautique sur la Jetée d'Acier.

DIMANCHE, 11IEME JOUR

Après-midi et soir—Presentation de drapeaux par chaque Etat des Etats Unis au escadrilles représentant les Etats-Chaque Etat offrira un drapeau à chaque escadrille dont la majorité des membres sont originaires de cet Etat. La présentation sera faite par les représentants, de l'Etat, de l'Aero Club, et de la branche de la Ligue Aérienne de cet Etat. (Tous les Etats et villes sont invités à envoyer des délégués, et l'Armée et la Marine à envoyer des représentants.)

LUNDI, 12IEME JOUR

Après-midi—Démonstration et conférences avec projections sur la valeur de l'Avion pour la publicité diurne et nocturne (Tous les agents et sociétés de publicité sont invités).

Soir—Transport aérien continental, Pan-Américaine. Discours par des membres des commissions de 20 Républiques latines-Américaines.

MARDI, 13IEME JOUR

Après-midi et soir—Transport aérien intercontinental Pan-Américaine. Discours par des membres des commissions de 20 Républiques Latines-Américaines.

MERCREDI ET JEUDI, 14IEME ET 15IEME JOUR

Après-midi et soir—Les voies aériennes et le transport aérien en Europe au Canada en Afrique en Australie et en Asie.

VENDREDI, 16IEME JOUR

Après-midi et soir—Instruments de Navigation aérienne pour voler au-dessus de la terre ou de l'eau (aviateurs, navigateurs, fabricants, d'instruments scientifiques et experts en aeronautique invités).

SAMEDI, 17IEME JOUR

Après-midi—Courses et concours aériens. Conférences et projections sur la photographie aérienne.

Soir—Exposition de photographies aériennes et d'appareils photographiques (Les photographes, professionels, et amateurs, et les fabricants d'appareils photographiques sont invités).

DIMANCHE, 18IEME JOUR

Après-midi et soir—Conférences sur la nécessité d'une attitude pluslarge en regard de l'assurance pour l'avion et les aviateurs.

Soir—Conférences avec projections. Comme quoi les mesures médicales et les inspections en vigueur dans l'armée diminuent les accidents. (Agents et compagnies d'assurance, invités).

MARDI, 20IEME JOUR

Après-midi et soir—Conférences avec projections, montrant les différentes routes aériennes pour traverser l'Atlantique, et les problèmes à résoudre pour accomplir la chose.

MERCREDI, 21IEME JOUR

Après-midi—Journée de la sureté de l'aviation. Discussions des mesures prises pour la sureté de l'aviation. Améliorations dans la construction d'avions. Sureté augmentée dans les moteurs d'avions. Dispositifs pour la sureté en vol.

Soir—Progrés faits dans l'art du pilotage d'avions. (Projections).

JEUDI 22IEME JOUR

Après-midi et soir—Conférences et discussions sur la Meteorologie. Comme quoi les bulletins meteorologiques peuvent être étendues et rendus plus efficaces par l'emploi de l'avion pour explorer les plus hautes couches de l'atmosphère. Comme quoi ces bulletins méteorologiques sont d'assistance à la navigation aérienne. Les facteurs climatérique et télégraphiques et leur relations à l'aeronautique.

VENDREDI, 23IEME JOUR

Après-midi et soir—Conférences sur la jurisprudence aérienne. Lois et reglements sur le trafic aérien (ler jour). Avocats, commissaires de trafic, autorités de police de différents pays, invités.)

SAMEDI, 24IEME JOUR

Après-midi et soir—Courses et concours. Conférences avec projections sur la necessité d'etablir un niveau d'altitude pour la circulation aérienne, internationale, interstate et interurbaine.

DIMANCHE, 25IEME JOUR

Après-midi et soir—Journée artistique de l'Aéronautique. Discours sur la peinture et la sculpture aérienne; et exposition de peintures par Lieut. Farré, Lt. Ruttan et autres. (Artistes, Directeurs de Galleries d'Art et amateurs d'oeuvres artistiques, invités.)

LUNDI, 26IEME JOUR

Après-midi et soir—Problèmems aéronautiques et leurs solutions probables Ouverture du concours pour les idées et projets de grands avions.

MARDI, 27IEME JOUR

Après-midi—Facteurs qui augmentent l'efficacité des grands dirigeables.

Soir Les avantages du plaquage et contre-plaquage dans la construction d'avion.

MERCREDI, 28IEME JOUR

Après-midi—Conférences sur le problème du vol à une altitude de ou supérieure à 25000 pieds et leur solutions probables.

Soir—Les moteurs d'avions actuels.

JEUDI, 29IEME JOUR

Après-midi—Hydravions versus avions pour le sport et le transport.

Soir—Concours pour les idées et projets de grands avions.

VENDREDI, 30IEME JOUR—"Memorial Day".

Après-midi—Courses de dirigeables; concours de rapidité d'ascension pour ballons captifs; concours de parachutes.

Soir—Réception au Hall de l'Aeronautique. Jetée d'acier.

SAMEDI, 31IEME JOUR

Après-midi—Concours d'avions, d'hydravions et de dirigeables. Concours d'aviettes auquel les cyclistes et les fabricants de cycles et motorcyclettes seront invités.

Soir—Aptitudes médicales pour les aviateurs de paix et de guerre. Rapports de différents pays, illustrés par des films intéressants (50,000 autorités médicales invités.)

DIMANCHE, 32IEME JOUR

Après-midi et soir—Remise des prix et diplômes pour tous concours et courses.

Le Gouvernement Français, les organisations aéronautiques, sportives, scientifiques, industrielles, et civiques de France sont invités à envoyer des représentants pour assister à cette grande convention aéronautique. En arrivant aux Etats Unis, ces représentants sont invités à se présenter à l'Etat Major du Comité de la Convention, au numéro 297, Madison Avenue, à New York pour se faire inscrire et recevoir leur insigne et le programme officiel.

Au cas où il leur serait plus facile de se rendre directement à Atlantic City, ils pourront s'y faire inscrire aux bureaux de la Convention, situés à l'un des Hotels suivants: Hotel Traymore, Hotel Chalfonte, Tbe Breakers Hotel, Hotel St. Charles, Hotel Marlborougb-Blenheim, Hotel Chelsea, Hotel Alamac, Hotel Dennis, et l'Hotel Haddon Hall.

Des représentants du Comité de la Convention seront aux bureaux de la convention aux hotels ci-dessus et délivreront les insignes officiels qui admettront les porteurs au Hall de l'aéronautique, à l'exposition sur la jetée d'acier, au stand des juges, pendant les concours, et à l'aérodrome et au centre d'hydravion où moteurs et machines seront démontrés.

Toutes comunications jusqu'au ler mai, devront être adressées au: Rear Admiral Peary, Chairman, Aeronautic Convention, Aero Club of America, 297 Madison Avenue, New York City.

LA SEGUNDA CONVENCION Y EXPOSICION AERONAUTICA PAN-AMERICANA

Celebrada Bajo Los Auspicios del "Aero Club of America," "The Aerial League of America" y "The Pan-American Aeronautic Federation".

Desde el Jueves Primero de Mayo Hasta el Primero de Junio, Ambos Inclusives de 1919
En Atlantic City, Estado de New Jersey, Estados Unidos de America

PROGRAMA

Concursos Que se Verificaran Todos Los Sabados:

(1) Concurso de Hidroaeroplanos (en general).
(2) Trofeo y Premios de Curtiss por Aviacion Maritima.
(3) Concurso de Hidroplanos Entre Universidades.
(4) Concurso de Aeroplanos Terrestres.
(5) Concurso de Globos Dirijibles.
(6) Concurso de Globos Sobre Velocidad en Ascender y Descender y sus Maniobras.
(7) Concurso de Paracaidas.
(8) Concurso de "Aviettes" (bicicletas y motocicletas con alas).

Programa Diario

(1) Exhibición de Aeroplanos, Motoras y sus Accesorias en el "Steel Pier."
(2) Demostracion y Ensayos de Hidroaeroplanos, Aeroplanos Terrestes, Motoras, Globos Dirijibles y Globos Cautivos, Para Compradores.
(3) Ascencion de Hidroplanos y Dirijibles con Pasajeros y Globos Cautivos.
(4) Vistas Cinematografas y Discursos Sobre Las Fases Mas Importantes de la Aeronautica, Como Siguen:

JUEVES PRIMER DIA

Apertura de la Convencion y Exposicion

EN LA TARDE—Recepcion en el salon aeronautico en el "Steel Pier." Discursos de los funcionarios del gobierno de los estados Unidos de America, del estado y de las sociedades aeronauticas.

EN LA NOCHE—Exposicion aeronautica y discursos de funcionarios.

VIERNES SEGUNDA DIA

EN LA TARDE—Exposicion aeronautica, ensayos preliminares de hidroplanos y globos dirijibles y cautivos.

EN LA NOCHE—Vistas cinematografas y discursos sobre aviacion de sport y paseo.

SABADA TERCER DIA

EN LA TARDE—Carreras de hidroaeroplanos y globos dirijibles y concurso en ascender y descender de globos cautivos.

EN LA NOCHE—Gran baile.

DOMINGO CUARTO DIA

EN LA MANANA—Serivios conmemorativos en honor de los aviadores difuntos por un prelado distinguido.

EN LA TARDE Y NOCHE—Recepcion a los aviadores mas renombrados aliados y a sus familiares y entrega de la medalla de valor del "Aero Club de America" y del diploma de honor de la "Aerial League de America."

LUNES QUINTO DIA

EN LA TARDE—Primer concurso de paracaidas por el premio de quinientos dollars de bennett.

EN LA NOCHE—El gran globo dirijible y su valor en la transportacion. Representantes de las empresas de ferrocarril, expreso, vapores y demas de transportes quedan invitados para asistir.

MARTES SESTO DIA

EN LA TARDE—Discursos con ilustraciones, de patrulla aeria de montes. (El departamento de montes de cada estado queda invitado.)

EN LA NOCHE—Trabajo de vigilancia policiaca aeria y razones por las cuales toda ciudad debe tener esta clase de servicio.

MIERCOLES SEPTIMO DIA

EN LA TARDE Y NOCHE—Dia de correos aerios. Discursos con ilustraciones y estudio de aeroplanos para servicio de correos. El presidente de la comision de correos de la camara de representantes y el de igual comite del senado asi como el ministro de comunicaciones de los Estados Unidos Sr. Burleson. Quedan invitados para dirijir la palabra. (Veinte seis mil administradores de coreo de los Estados Unidos y las camaras de comercio de trece mil ciudades quedan invitados para asistir.)

JUEVES OCTAVO DIA

EN LA TARDE Y NOCHE—Discursos con ilustraciones sobre las necesidades de aerodromos municipales y de la parte que debe tomar la aeronautica en los proyectos de ciudades. (Las camaras de comercio y las comisiones de proyectos de ciudades de 13,000 ciudades quedan invitadas para asistir.)

VIERNES NOVENO DIA

EN LA TARDE—Llegada de hidroplanos y aeroplanos del ejercito y la Marina de sus respectivas estaciones. Segundo concurso de paracaidas por el premio de $500 de Bennett.

EN LA NOCHE—Discursos con ilustraciones de los mas recientes desarollos en la guerra aeria y hazañas relatadas por famosos aviadores.

SABADO DECIMO DIA

EN LA TARDE—Dia del Ejercito y Marina. Concurso aeronautico.

EN LA NOCHE—Recepción a los oficiales de la Marina y Ejercito de los Estados Unidos. Recepción y discursos en el Salón de Exhibición Aeronautica en el "Steel Pier."

DOMINGO ONDECIMO DIA

EN LA TARDE Y NOCHE—Presentación de banderas por cada uno de los Estados de los Estados Unidos de America a sus respectivos escuadrones aereos. Cada Estado presentará una bandera al escuadron aereo respectivo que contenga el mayor número de naturales de aquel estado. La presentación se hara por los representantes del estado y del Club Aereo y Liga Aeria de aquel Estado. (Todos los Estados y ciudades quedan invitados para enviar sus delegados y el ejercito y marina para enviar representantes.)

LUNES DUODECIMO

EN LA TARDE—Demostraciones y discursos con ilustraciones sobre el valor de la aeronautica para anuncios de dia y de noche. (Todas personas y agentes dedicados al negocio de anuncios quedan invitados para asistir.)

EN LA NOCHE—Transporte aereo terrestre Pan-Americano. Discursos por los miembros de las Comisiones de las veinte Republicas Pan-Americanas.

MARTES DECIMO-TERCERO

EN LA TARDE Y NOCHE—Transporte aereo maritimo Pan-Americano. Discursos por los miembros de las Comisiones de las veinte Republicas Pan-Americanas.

MIERCOLES Y JUEVES DIAS 14 Y 15

EN LA TARDE Y POR LA NOCHE—Dias y transportes aereos en Europa, Canada, Africa, Australia y Asia.

VIERNES DIA 16

EN LA TARDE Y POR LA NOCHE—Instrumentos para la aviación terestre y maritima. (Aviadores, navegadores, fabricantes de instrumentos cientificos y peritos en aeronautica quedan invitados.)

SABADO DIA 17

POR LA TARDE—Carreras y concursos aereos. Discursos con ilustraciones sobre la fotografia aerea.

POR LA NOCHE—Exhibición extensa de fotografias aereas y aparatos fotográficos. (Fotografos, tanto los profesionales como los afisionados y fabricantes de aparats fotograficos quedan invitados.)

DOMINGO DIA 18

EN LA TARDE Y POR LA NOCHE—Discursos con ilustraciones sobre la exploración aerea y el uso de la aereonave para estudios geodeticos y de costas.

LUNES DIA 19

EN LA TARDE Y POR LA NOCHE—Discursos sobre la necesidad de un concepto mas ámplio relativo al seguro de aereonaves y aviadores.

POR LA NOCHE—Discursos con ilustraciones sobre la manera en que los requisitos e inspección medico-militares disminuyen el número de accidentes. (Compañias de seguros y agentes quedan invitados.)

MARTES DIA 20

EN LA TARDE Y POR LA NOCHE—Discursos con ilustraciones mostrando diferentes modos de cruzar el Mar Atlantico por el aire y los problemas que deben resolverse para realizar dicho objeto.

MIERCOLES DIA 21

EN LA TRADE—Dia de Seguridad Aerea. Discusiones sobre las disposiciones hechas para la seeguridad aerea; mejoras en la construcción de aeroplanos; aumento de estabilidad en las motoras aereas; divisas para aumentar la seguridad aerea.

EN LA NOCHE—Progreso realizado en el manejo de los aeroplanos (con ilustraciones).

JUEVES DIA 22

EN LA TARDE Y NOCHE—Discursos y discusiones sobre metereologia-manera de extender los informes metereologicos y hacerlos mas eficaces mediante el uso de aeronaves en la exploración de las altas regiones del aire asi como la manera en que los pronosticos metereologicos pueden ser de auxilio en la navegación aerea; y factores telegraficos y climaticos en relación a la aeronautica.

VIERNES DIA 23

EN LA TARDE Y NOCHE—Discursos sobre la jurisprudencia aerea-leyes aereas y reglamentación del trafico aereo (primer dia). (Abogados Jefes de Trafico y Autoridades Policiacas de los distintos paises quedan invitados.)

SABADO DIA 24

EN LA TARDE—Carreras y concursos.

EN LA NOCHE—Discursos con ilustraciones sobre la necesidad de establecer lineas de altitud para viajes internacionales, entre los estados y entre las ciudades por medio del aire.

DOMINGO DIA 25

EN LA TARDE Y NOCHE—Da de Arte Aeronautica. Discurso sobre la pintura y escultura aeronautica de los distintos paises y exhibición de los cuadros aereos por el Teniente Farré, Teniente Ruttan y otros. (Artistas prominetes y directores de Salones de Artes y demás interesados quedan invitados.)

SEMANA DE INGENIERIA.

LUNES DIA 26

EN LA TARDE—Problemas de ingenieria aeronautica y su porspectiva solución.

EN LA NOCHE—Apertura del Concurso para diseños e ideas sobre grandes aeroplanos.

MARTES DIA 27

EN LA TARDE—Factores que contribuyen al aumento de la eficiencia de los grandes globos dirijibles.

EN LA NOCHE—Ventajas de enchapear y de la madera denominada "plywood" en la construcción de aereonaves.

MIERCOLES DIA 28

EN LA TARDE—Discursos sobre los problemas de volar a una altura de 25,000 pies y mas, y su solución prospectiva.

EN LA NOCHE—Máquinas aereas de la actualidad.

JUEVES DIA 29

EN LA TARDE—Tema: "Flying-boats" contra hidroplanos para sport y transporte.

EN LA NOCHE—Concurso sobre diseños e ideas para grandes aeroplanos.

VIERNES DIA 30

EN LA TARDE—Carreras entre globos dirijibles, concurso de velocidad de ascender y descender de globos cautivos; concurso de paracaidas.

EN LA NOCHE—Recepción en el Salón Aeronautico en el "Steel Pier."

SABADO DIA 31

EN LA TARDE—Concursos de hidroplanos, aeroplanos, y globos dirijibles. Concurso de "Aviettes" al cual serán invitados todos los biciclistas y fabricantes de bicicletas y motocicletas.

EN LA NOCHE—Requisitos medicos para aviadores en tiempo de guerra y de paz. Informes de distintos paises ilustrados con vistas cinematografas de atractivo. (50,000 medicos quedan invitados.)

DOMINGO DIA 32.

EN LA TARDE Y NOCHE—Presentación de premios y diplomas de todos los concursos.

Los Gobiernos de la Argentina, Brasil, Bolivia. Chile, Colombia. Costa Rica, Cuba, República Dominicana, Ecuador, Honduras, Haití, Panamá Guatemala, Paraguay, Perú, Portugal, El Salvador, Españna, Uruguay, Venezuela, Mejico, y Nicaragua, asi como las Sociedades Aeronaúticas, Deportivas, Científicas, Industriales y Cívicas, de los mismos paises, por la presente quedan invitadas para enviar representantes a asistir a ecte gran concurso aeronaútico. Dichos representantes a su llegada a los Estados Unidos deberán presentarse a la oficina principal del Comité encargado de la Convención, en el número 297 Avenida de Madison, en la ciudad de New York, para inscribirse y al proprio tiempo recibir sus credenciales y copia del programa oficial.

En el caso de que les sea mas conveniente a algunos de los representantes ir directamente a Atlantic City, dichos señores podrán inscribirse en las oficinas de la Convención que estarán constituidas en dicho lugar en los siguientes hoteles: "Traymore," "Chalfonte," "The Breakers," "St. Charles," "Marlborough-Blenheim," "Chelsea," "Alamac," "Dennis" y "Haddon Hall."

En Comité de la Convención tendrá representantes en las oficinas de la Convención Aeronaútica en dichos hotelesquienes expedirán las credenciales o chapas oficiales de entrada al portador para el Salón Aeronaútico, la Exposi-ción Aeronaútica en el "Steel Pier," la sección apartada para los Jueces durante el concurso, y al "Aerodromo" yestaciones para hidroaeroplanos donde habrán exhibiciones de aeronaves y sus motoras.

Sírvase dirijir todas sus comunicaciones hasta el primero de Mayo Próximo venidero, al Sr. Contraalmirante Peary, en la forma siguiente: Rear Admiral Peary, Chairman, Aeronautic Convention, Aero Club of America, 297 Madison Avenue, New York City.

SECONDA CONVENZIONE ED ESPOSIZIONE AEREONAUTICA PAN-AMERICANA

Sotto gli Auspici dell'Aero Club of America, dell'Aerial League of America e della Federazione Aeronautica Pan-Americano

Dal Primo Maggio 1919, al Primo Giugno incluso,
ad
Atlantic City, N. J.

PROGRAMMA

GARE CHE AVRANNO LUOGO OGNISABATO

(1) Gare Idroplani (generale).
(2) Voli nautici apparecchio tipo Curtiss-Trofei e Premi.
(3) Gare Idroplani (Universita).
(4) Gare Aeroplani di terra.
(5) Gare Dirigibili.
(6) Gare Velocita ascesa e discesa, e manovre di Palloni frenati.
(7) Gare Paracadute.
(8) Aviette (Velocipedi e motocicli alati).

AVVENIMENTI QUOTIDIANI

(1) Esposizione di Aeroplani, Motori ed accessori sullo Steel Pier (Ponte d'Acciaio).

(2) Esercitazioni e prove idroplani, Aeroplani di terra, motori, Dirigibili, Palloni frenati.

(3) Trasporto Aereo passeggeri su Idroplani, e Dirigibili-Ascensioni Palloni frenati.

(4) Spettacolo cinematografico e discorsi sul elpiu importanti fasi dell'Aereonautica, nell'ordine seguente:

GIOVEDI, 1MO GIORNO

Apertura Convenzione ed Esposizione.

POMERIGGIO—Ricevimento nella Sala Aereonautica sullo Steel Pier. Conferenze Autorita Federali, Statali, ed Aereonautiche.

SERA—Esposizione Aereonautica e discorsi ufficiali.

VENERDI, 2DO GIORNO

POMERIGGIO—Esposizione Aereonautica—prove preliminari, idroplani, Dirigibili, e Palloni Frenati.

SERA—Cinema e conferenza-soggetto "Aereonautica Sportiva."

SABATO, 3O GIORNO

POMERIGGIO—Corse Idroplani e dirigibili; gare di velocitá ascesa e discesa Palloni frenati.

SERA—Ballo.

DOMENICO, 4TO GIORNO

MATTINO—Un eminente Ecclesiastico commemorerá gli Aviatori defunti.

POMERIGGIO E SERA—Ricevimento "Assi" alleati ed eroi dell'Aria e loro parenti—Annunzio conferimento medaglia al valore dell'Aero Club of A. e diploma d'onore dell'Aerial League of America.

LUNEDI, 5TO GIORNO

POMERIGGIO—Prima Gara Paracadute. Premio Bennett $500.

SERA—Il Dirigibile di grosse dimensioni e la sua utilitá per trasporti. Sono invitati i Sigg. Rappresentanti delle ferrovie, dell Compagnie di Express, delle Compagnie di Navigazione e di altri servizi-trasporti.

MARTEDI, 6TO GIORNO

POMERIGGIO—Conferenze con proiezioni sulla "Guardia Forestale Aerea" (Sono invitati i rappresentanti dei Dipartimenti forestali di ogni Stato.)

SERA—Polizia aerea (squadre) e le ragioni per le quali ogni cittá dovrebbe averne una.

MERCOLEDI, 7MO GIORNO

POMERIGGIO E SERA—Giornata "Posta Aerea". Conferenza con proiezioni—Considerazioni su la "posta aerea". Sono invitati a parlare: il Capo del Comitato ufficio Posta e servizio Stradale della Camera di Deputati e del Senato e il Direttore Generale della Posta, Sig. Burleson (26,000 impigati postali ed i rappresentanti delle Camere di Commercio di 13,000 cittá).

GIOVEDI, 8VO GIORNO

POMERIGGIO E SERA—Conferenza con proiezioni sulla necessitá di costruire aerodromi municipali e sull agrande influenza che gli aeroplani avranno nella costruzione e nello svliuppo delle nuove cittá. (Sono invitati i Commissari delle Camere di Commercio e degli uffici Planimetrici municipali di 13,000 cittá.)

VENERDI, 9O GIORNO

POMERIGGIO—Arrivo di Odroplani e di aeroplani dell'esercito da stazioni aeree dell'esercito e della marina. Seconda gara paracadute premio Bennett $500.00.

SERA—Conferenza con proiezioni sui recentissimi progressi della lotta aerea narrate da famosi "Assi."

SABATO, 10MO GIORNO

POMERIGGIO—Giornata in onore dell'esercito e della Marina—Gare Aeree e tornei.

SERA—Ricevimenti Sigg. Ufficiali dell'Esercito e della S. U. Trattenimento e discorsi nella sala dell'Esposizione Aereonautica sullo Steel Pier.

DOMENICA, 11MO GIORNO

POMERIGGIO E SERA—Presentazione delle bandiere da parte di ciascun Stato degli S. U. alle squadre aeree che li rappresentano. Ciascun Stato presentera una bandiera a ciascuna squadra aerea, i membri della quale saranno possibilmente tutti nativi dello Stato che rappresentano. I rappresentanti delle succursali in ogni Stato dell'Aereo Club e dell'Aerial League faranno tale rappresentazione. (Ciasun Stato e ciascuna cittá saranno invitati a mandare delegati e l'Esercito e la Marina a mandare rappresentanti.)

LUNEDI, 12MO GIORNO

POMERIGGIO—Conferenze illustrate sul valore della macchine deree come mezzi di "reclame" di giorno e di notto. (Sono invitati tutte le compagnie di pubblicita nazionali ed estere.)

SERA—Trasporto Aereo Pan-Americano su terra. Conferenze di membri delle Commissioni delle venti repubbliche America-latine.

MARTEDI, 13MA GIORNATA

POMERIGGIO E SERA—Trasporto Aereo Pan-Americano sopra acqua. Conferenze di membri delle Commissioni delle venti repubbliche Americo-Latine.

MERCOLEDI, E GIOVEDI, 14MO E 15MO GIORNO

POMERIGGIO E SERA—Le Vie Aeree ed il Trasporto Aereo in Europa, Canada, Africa, Australia ed Asia.

VENERDI, 16MO GIORNO

POMERIGGIO E SERA—Istrumenti di navigazione Aerea per voli sopra terra e sopra mare. (Sono invitati aviatori, naviganti, fabbricanti strumenti scientifici a periti aereonautici.)

SABATO, 17MO GIORNO

POMERIGGIO—Corse e gare aerenautiche. Conferenze con proiezioni sul l'Arte Fotografica Aerea.

SERA—Esposizione su vasta scala di Fotografie Aeree e di apparati fotografici. (Sono invitati tutti i fotografi, professionisti e dilettanti, e fabbricanti di apparati fotografici.)

DOMENICA, 18MO GIORNO

POMERIGGIO E SERA—Conferenze Illustrate con proiezioni sull'Esplorazione Aerea e sull'uso di velivoli per le misurazioni costiere e geodetiche.

LUNEDI, 19MO GIORNO

POMERIGGIO—Conferenze sul bisogno di un miglior trattamente da parte delle Compagnie d'Assicurazione nelle condizioni di assicurazione delle macchine e degli aviatori.

SERA—Conferenze con proiezioni sull'influenza che i sistemi del Corpo Medico dell'Esercito hanno sulla diminuzione delle disgrazie. (Sono invitati tuttigli agenti delle Compagnie di Assicurazione.)

MARTEDI, 20MO GIORNO

POMERIGGIO E SERA—Conferenze Illustrate indicanti i vari modi gi studiati per attraversare l'Atlantico nell'Aria—ostacoli da vincere, problemi da risolvere per poter compiere felicemente il viaggio.

MERCOLEDI, 21MO GIORNO

POMERRIGIO—Giornata dedicata alla sicurezza Aerea—Discussioni su provvedimenti presi per la sicurezza Aerea—Perfezionamenti nella costruzione degli aereoplani; Aumentata sicurezza di motori aerei; congegni atti a migliorare la stabilitá dei voli.

SERA—Progressi fatti nell'arte dei piloti aviatori. (Illustrazioni.)

GIOVEDI, 22MO GIORNO

POMERIGGIO E SERA—Conferenze e discorsi di meteorologia; come possono essere fatte piu esattamente le previsioni meterorologiche esplorando l'aria con velivoli negli strati superiori, e come queste previsioni meteorologiche possono essere utili alla nagivazione aerea—Fattori telegrafici e climatici in relazione all'Aereonautica.

VENERDI, 23MO GIORNO

POMERIGGIO E SERA—Conferenze sulla giurisprudenza aerea; leggi e regolamenti per il traffico Aereo. (Avvocati, Commissario di traffico, Autorita di Polizia dei differenti paesi invitati.)

SABATO, 24MO GIORNO

POMERIGGIO E SERA—Corse e gare—Conferenze illustrate sul bisogno di stabilire un livello di altezza per il traffico aereo internazionale, interstatale, e interurbano.

DOMENICA, 25MO GIORNO

POMERIGGIO E SERA—Giornata d'Arta Aeronautica. Conferenze sulla Pittura e sulla Scultura di ogni paese su soggetti d'Aereonautica. Esposizione di quadri di soggetto dei tenenti Farre, Ruttan, e di altri. (Sono invitati tutti i piú Valenti artisti, i direttori di Gallerie d'Arte e gli amatori d'Arte.)

SETTIMANA DEDICATA ALLA "MECCANICA"

LUNEDI, 26MO GIORNO

POMERIGGIO—Problemi di meccanica aeronautica e la loro probabile soluzione.

SERA—Apertura di un concorso—disegni ed idee per la costruzione di grandi aeroplani.

MARTEDI, 27MO GIORNO

POMERIGGIO—Fattori che possono aumentare l'efficienza di grandi dirigibili.

SERA—Vantaggi del legno compensato per la costruzione di velivoli.

MERCOLEDI, 28MO GIORNO

POMERIGGIO—Conferenze sui problemi che si affacciano per voli a 25,000 piedi a piu e la loro probabile soluzione.

SERA—Macchine aere d'oggi.

GIOVEDI, 29MO GIORNO

POMERIGGIO—Battelli volanti contro Idroplani per Sport e per trasporti commerciali.

SERA—Gare—Disegni ed idee per aeroplani di grandi dimensioni.

VENERDI, 30MO GIORNO

(Giorno Commemorativo)

POMERIGGIO—Corse Dirigibili—Gare di velocita d'ascensione tra palloni frenati—Gara paracadute.

SERA—Grande ricevimento nella Aereonautic Hall, Steel Pier.

SABATO, 31MO GIORNO

POMERIGGIO—Gare tra idroplani, aereoplani dirigibili—Gara Aviette alla quale interveranno tutti i ciclisti ed i fabbricanti di biciclette e di motociclette.

SERA—Sistemi e regolamentari medici internazionali per aviatori in guerro ed in pace. Relazioni sui sistemi adottati nei differenti paesi, illustrate da interessanti proiezioni. (Sono invitati 50,000 Sanitari.

DOMENICA, 32MO GIORNO

POMERIGGIO E SERA—Distribuzione generale dei diplomi.

Il Governo d'Italia e le organizzazioni italiane di Aeronautica di Sport e di Scienze sono invitati o mandare rappresentanti ad assistere a questo grande evento aereonoutico. Arrivando negli Stati Uniti i Signori Rappresentanti dovranno presentarsi al Quartiere Generale del Somitato ol N. 297 Madison Ave., N. Y., per registrarsi e ricevere la targhetta ufficiale, nonché il programma.

Nel caso fosse per loro piú conveniente recarsi direttamente ad Atlontic City, potronno registrorsi colá presso gli uffici situati nei seguenti alberghi: Hotel Traymore, Hotel Chalfonte, The Breokers Hotel, Hotel St. Charles, Hotel Marlborough-Blenheim, Hotel Chelsea, Hotel Alamac, Hotel Dennis ond Hotel Haddon Hall.

I Rappresentanti del Comitato di Convenzione si troveranno negli uffici della Convenzione Aereonautico nei sunnominati Alberghi e distribuiranno i distintivi ufficiali che daranno al portatore il diritto di essere ammesso all'Aereonautic Hall, all'Esposizione sullo Steel Pier, nel recinto occupato dai giudici durante la gara, all'Aerodromo, all stazione degli idroplani dove saranno esibiti i velivoli ed i motori.

Ogni comunicazione sino al primo Marzo dovrá essere indirizzata al Rear Admiral Peary, Chairman, Aeronautic Convention, Aero Club of America, N. 297 Madison Ave., New York.

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THE AERO SHOW TO BE FOLLOWED BY AEROPLANE AND DIRIGIBLE RACES AND ONE MONTH AERONAUTICAL CONVENTION

THE Show is a huge success and the organizers deserve great credit. The setting, the exhibits and the attendance—everything is up to expectations.

Thousands of people have attended the Show each day and packed the aisles so that people who came with the intention of ordering planes had to postpone doing so.

The numerous exhibits are described elsewhere in this number.

This Show and the aeroplane and dirigible races and the one month Aeronautic Convention and other events to be held at Atlantic City beginning with May 1st will interest hundreds of thousands of people in aeronautics. The Atlantic City plan will permit actual demonstrations of aircraft to prospective buyers. This plan will greatly facilitate the work of selling aircraft to prospective buyers, who after seeing the aircraft exhibited on the Steel Pier and seeing them in flight during the races, can proceed to the beach or the aerodrome and get a ride on the craft he or she has selected and will be able to place the order there and then for the craft selected.

A great many of the people who are attending the New York Aero Shows will be at Atlantic City to see the demonstrations and races. Many who have just become interested and who probably would not go any further in aeronautics this year, will go to Atlantic City and order planes for use in the summer. Representatives of college groups will look over balloons for the balloon races to be held at St. Louis in the Fall.

Selecting Aircraft for Atlantic City Races

The announcement of the Atlantic City events created additional interest in the New York Show. Prospective entrants for the competitions are looking over the aircraft exhibited at the Show with a view of selecting "winners" for the Atlantic City races.

Tens of Thousands of People to Attend Convention to Discuss New Phases of Aeronautics in Which They Are Interested

The convention aims for the first time in the history of aeronautics to permit thorough discussion of each of the important phases of aeronautics so that people interested in each phase may acquire all the information available on the subject.

The program is most thorough and complete. Tens of thousands of people of different lines of human endeavor related to aeronautics are invited to attend. For instance, on the fifth day, when the "Large Dirigible and Its Value for Transportation" is discussed, there are invited the representatives of railroads, express, steamship and other transportation organizations invited to attend.

For the illustrated addresses on "Aerial Forest Patrol," the Forestry Department of every State are invited. For the discussion of the "Work of Aerial Police Squadrons, and Why Every City Should Have One," the police commissioners of all cities are invited.

For the illustrated address on, and consideration of "Aerial Mail Plans," the Chairman of Post Office and Post Roads Committees of House of Representatives and Senate, and Postmaster General Burleson and 26,000 United States postmasters, and Chambers of Commerce of 13,000 cities are invited to attend.

Likewise for the illustrated addresses on the "Need of Municipal Aerodrömes, and the Part To Be Played By Aircraft In City Planning," the Chambers of Commerce and City Planning Commissions of 13,000 cities are invited to attend.

For the presentation of the flags by each State of the United States to the Aero Squadrons representing the States, all the States and cities are invited to send delegates and Army, Navy and Marine Corps to send representatives.

For the demonstrations and illustrated addresses on the "Value of Aircraft for Advertising by Day and by Night," all national advertisers and advertising agents are invited to attend. For the discussion of "Pan-American Aerial Transport," the commissions of the 20 Latin-American Republics are invited to attend.

For the discussion of "Aerial Navigation Instruments for Flying Over Land and Water," aviators, navigators, scientific instrument makers and aeronautic experts are invited to attend.

For the addresses on "Aerial Photography," all the photographers, professional and amateur, and makers of photographic apparatus are invited to attend.

For the addresses on "Aerial Exploration and the Use of Aircraft for Coast and Geodetic Survey," all people interested in exploration and surveying are invited to attend.

For the addresses on "Need of Broader Attitude Regarding Insurance for Aircraft and Aviators," all the insurance companies and agents are invited to attend.

For the addresses on "Aerial Jurisprudence—Aerial Laws and Regulation of Air Traffic," all lawyers, traffic commissioners and police authorities of different countries are invited to attend.

For the Aeronautic Art Day, when an address on "Aerial Painting and Sculpture of Different Countries" will be delivered and exhibition of aerial paintings by Lieut. Farre, Lieut. Ruttan and others, all the prominent artists, managers of art galleries and art patrons are invited to attend.

The engineers are invited to attend aeronautic week, when basic problems of aeronautic engineering are to be considered.

For the discussions of "Meterology—How the Weather Forecasts Can Be Extended and Made More Efficient by the Use of Aircraft in Exploring the Upper Air," also "How the Weather Forecasts Help Aerial Navigation" and "Telegraphic and Climatic Factors in Relation to Aeronautics," people interested in the subject are invited to attend.

For the discussion of "International Medical Standards for Aviators in War and Peace," when reports from different countries will be presented by the highest authorities on the subject, 50,000 medical men are invited to attend.

Every Day Plenty of Aeronautic Activities—Every Saturday Contests

Every day will have plenty of aeronautic activities, as follows:

(1) *Exhibits of aeroplanes, motors and accessories on the Steel Pier.*

(2) *Demonstrations and tests of seaplanes, land aeroplanes, motors, dirigibles, kite balloons, to prospective purchasers.*

(3) *Aerial passenger carrying by seaplanes and dirigibles, and kite balloon ascensions.*

(4) *Moving pictures and addresses by leading authorities on most important phases of aeronautics.*

The contests to be held every Saturday are most interesting. They are:

(1) Seaplane contests (general).
(2) Curtiss Marine Flying Trophy and prizes.
(3) Intercollegiate seaplane contests.
(4) Land aeroplane contests.
(5) Dirigible contests.
(6) Kite balloon speed in ascending and descending, and maneuvering contests.
(7) Parachute competition.
(8) Aviette (bicycles and motorcycles with wings) contests.

The Atlantic City convention is to be a potential factor in starting American aeronautic activities on a permanent basis.

AIRMEN MEMORIAL FUND CREATED BY AERO CLUB OF AMERICA

THE Aero Club of America has adopted the plan to put up a memorial "To the Airmen Who Cannot Come Back" in the famous graveyard at Toul, where Major Lufbery, Hobey Baker, Blair Thaw and other famous Americans are buried, which was proposed to the Aero Club of America at the club's annual banquet by Captain Eddie Rickenbacker, the American Ace of Aces.

Captain Rickenbacker has been selected as chairman of the Memorial Committee and the fund has been started with the following contributions:

Aero Club of America	$500.00
Aerial League of America	500.00
Alan R. Hawley	100.00
Henry A. Wise Wood	100.00
Henry Woodhouse	100.00
Charles Jerome Edwards	100.00
J. Parke Channing	50.00
C. R. Corning	50.00
John Hays Hammond, Jr	50.00
Augustus Post	50.00
G. Douglas Wardrop	50.00
Evan J. David	50.00
Capt. Herbert S. Mapes	50.00
K. M. Turner	50.00
Lieut. M. Gilbert Whitman	25.00
Lieut. Granville A. Pollock	25.00

It is requested that subscriptions to this fund be addressed to Captain Eddie Rickenbacker, Chairman, Airmen's Memorial Fund, Aero Club of America, 297 Madison Avenue, New York City. Checks should be made payable to the Airmen's Memorial Fund.

Captain Rickenbacker's appeal for a memorial to his dead comrades was most touching. He said:

"I recall a little graveyard just outside of Toul, which is probably the most famous graveyard as far as Americans are concerned. Such men as Lufbery, Hobey Baker, Lieut. Blair Thaw and probably one dozen others are quietly resting there. And for that reason I think in some way we should look into the future and plan for a memorial to these men, as they were the real heroes after all, the men who were the inspiration to us boys who were more fortunate, and who had the good fortune to come back and receive the admiration and the ovation of the multitudes of people of the dear old United States of America.

"I remember I had not arrived in Columbus but a few moments, when going up the main street of the town I saw a temporary memorial 'To the Boys of Columbus,' with their names inscribed on it. Something which will be made permanent to live for centuries thereafter will be erected there. And I thought this evening would be a good time to bring up and suggest such a memorial for this little graveyard just outside of Toul, which we all know so well; and something to perpetuate the memory of the boys left behind. I hope one and all of you will try to think now and then of these boys, and not overlook the fact that we here are not entitled to all of this applause—there are others!

"If I had my way about it, the parents of the boys left in France the mothers, would have the decorations which I have today. In years to come we can say with a clear conscience that those who gave their all for the cause which brought us fame are the men whose memories shall stand out, and the future generations of America's air fleet, America's eagles, will look back with that realization in mind.

"I do not want you to feel that I am trying to bring back something that you want to forget. I do not believe any one of you is trying to forget all of the horrors of this war, yet it is a part of the make-up of the American public to want to forget too soon. Consequently, I suggest again that the Aero Club of America and each and every one of you present will do your share and bit in contributing to this memorial to 'The Men Who Shall Not Come Back.'"

The matter of putting up a suitable memorial to dead airmen in the United States has been given consideration by the Club since the beginning of the war. It was realized at the time that instead of having a monument for each aviator it would be better to wait and have one memorial for all the aviators who lost their life in the fight for humanity and civilization. Therefore a resolution was adopted to that effect and a committee with Admiral Peary as chairman was appointed to outline the plans for such a memorial.

Two suggestions made by the committee, which have been approved and are being carried out are:

(1) To ask every State and every city to present and dedicate a flag to each aero squadron and balloon company whose members were in preponderance from that State or city. The flag is to bear the insignia of the State or of the city as well as the insignia of the squadron itself. This plan has received the enthusiastic approval of the aviators to whom it has been submitted for an expression of opinion.

(2) To place the names of all the airmen who lost their lives during the war on a permanent Honor Roll, to occupy a prominent place in the club house of the Aero Club of America. This plan has also been approved and is being carried into effect.

Transatlantic Flight

Every effort is being made by the Navy Department to get the giant seaplane at the Rockaway training station ready for the proposed transatlantic flight. There is keen rivalry among the navy, the army and the British dirigible for the honor of being the first to cross the ocean. All three machines are theoretically abundantly able to make the flight and, as each is of a different type, the test will offer a chance to compare their different merits.

The naval craft has already carried many passengers, has attained a speed of eighty-five miles an hour and can climb 2,000 feet in ten minutes, thereby proving its abilities. It is intended to have two pilots, who will be seated side by side, and a crew of five men in an enclosed cabin. It has been estimated that the trip between Newfoundland and Ireland can be made in fifteen hours.

The army aeroplane, which is yet to be built, will be of the Glenn-Martin type and will have no pontoons—which would be unfortunate in case it fell into the water. To compensate, its speed will be considerably greater, but it will have to take a longer route—by way of the Azores, landing either in France or England.

Very little has leaked out about the plans for the voyage of the British dirigible, but an expert has already arrived in Newfoundland to pick out a suitable landing place. The British machine is under the disadvantage of possible head winds, as the revolution of the globe throws the lighter aerial envelope from west to east faster than the solid earth.

One great question is that of directing the course of the machines. On such a rapidly moving surface compasses would be unreliable and the sun's position would not offer a sure index of locality. The suggestion is made in the European edition of the *Herald* that the flights take place at night, when the North Star would he a safe guide. It instances the plight of two French aviators who, after crossing the Mediterranean from Marseilles to Algeria, were unahle on their return to find the Balearic Islands, where they intended to make a landing, and reached Spain instead.

The Aeronautic Exposition

THE Aeronautic Exposition, being held in Madison Square Gorden and the 69th Regiment Armory, under the auspices of the Manufacturers Aircraft Association, was opened to the public on March 1. The attendance on the opening night created a record, and has been very well sustained during the past week.

The exhibits bear wonderful testimony to the energy and aggressiveness of the American aeronautic industry, and one calculated to inspire confidence in the possibilities of aerial transportation and sport, as is evidenced in the descriptions of the exhibits in this issue of Aerial Age.

The Committee in charge of the Exposition on arrangements. Top row: Fay L. Faurote, Frank H. Russell, S. S. Bradley, Inglis M. Uppercu. Bottom row: G. M. Williams, B. A. Guy, Harry Bowers Mingle, Albert H. Flint

AEROPLANE EXHIBITS

AEROMARINE PLANE AND MOTOR COMPANY

(Garden, South Section, Main Floor)

Aeromarine Model 50 Flying Boat is similar to the Model 40 except that in the latter machine the cabin is closed in by a transparent hood and it is driven by an Aeromarine 130 H.P. Type L engine. The Model 50 is a sport machine designed for pleasure flying.

The upper plane has a span of 48′ 4″, lower plane, 37′ 4″, and a chord of 6′ 3″, stagger of 12″. The gap between the planes is 78″. Fully loaded the machine weighs about 2,500 pounds. Unloaded the weight is about 2,000 pounds.

BOEING AEROPLANE COMPANY

(Armory, Southeast Section)

The Type C-1-F Navy Training Hydro Aeroplane was flown from Hampton Roads, Va., to Rockaway, N. Y., for exhibition at the Aero Show. This machine is equipped with a Curtiss OXX-5 100 H.P. motor. It is an experimental type built for the Navy and has single float instead of the double floats usually employed on Boeing seaplanes.

The top plane is carried on inverted V central struts with no center panel. There is no horizontal stabilizer and the tail flaps are of the balanced type.

The general specifications of the C-1-F are as follows:

Span, both planes	43′ 0″
Chord	5′ 9″
Gap	6′ 0″
Stagger	29¼″
Overall length	24′ 0″
Dihedral	1°
Decalage	2½°
Speed range	36-65 M.P.H.

BURGESS COMPANY

(Armory, Southeast Section)

The Burgess Company is exhibiting a car designed for one of the "C" class twin-motored Navy dirigibles. The car is of streamline form, 40 feet long, 5 feet in maximum diameter, with steel tube outriggers carrying an engine at either side. Overall width of outriggers, 15 feet. Complete weight of car, 4,000 pounds.

Seven passengers may be carried, but the usual crew consists of four. At the front, the coxswain is placed; his duty is to steer the machine from right to left. In the next compartment is the pilot, who operates the valves and controls the vertical movement of the ship, and aft of the pilot the mecbanicians controlling the engines. At the rear cockpit is the wireless operator.

The engines are made by the Union Gas Engine Company and are 150 H.P. each. Fuel capacity, 240 gallons; oil, 16 gallons. Four bombs, totaling 1,080 pounds, are carried at the side.

The dirigible for which the car was designed is 192 feet long, 43 feet wide, and 46 feet high; it has a capacity of 180,000 cubic feet. Its high speed is 59 M.P.H., at which speed it has an endurance of 10 hours. Cruising speed, 42 M.P.H.; cruising radius, 12½ hours. Climb, 1,000 feet per minute.

THE CANTILEVER AERO CO.

(Garden, South Section)

The "Christmas Bullet" has caused a great deal of comment in aeronautical circles because of its freedom from struts and wires. It is the first heavier-than-air machine built on the Cantilever truss principle, and is the result of years of painstaking investigations and experiments made by the inventor, Dr. William Whitney Christmas.

The wings of the Christmas Bullet are flexible and resemble true bird form. Because of this yielding principle the machine is absolutely immune from all strain and resistance as are "stiff-wing," parallel-strut machines.

The "Christmas Bullet" has a horsepower of 185 and has flown 197 miles per hour—a world's record.

General specifications of this machine are as follows:

Span, upper plane	28′ 0″
Span, lower plane	12′ 0″
Chord, upper plane	5′ 0″
Chord, lower plane	2′ 6″
Area, upper plane	140 sq. ft.
Area, lower plane	30 sq. ft.
Length overall	21′ 0″
Weight, machine empty	1,820 lbs.
Weight, fully loaded	2,100 lbs.
Minimum speed	50-60 M.P.H.
Maximum speed	185 M.P.H.
Cruising radius	550 miles
Dihedral	minus 17°

A Liberty "6" engine is used, giving 185 H.P. at 1,400 R.P.M.; the machine attains 170 miles at three-quarter throttle.

CAPRONI COMPANY

(Armory, East Section, Center)

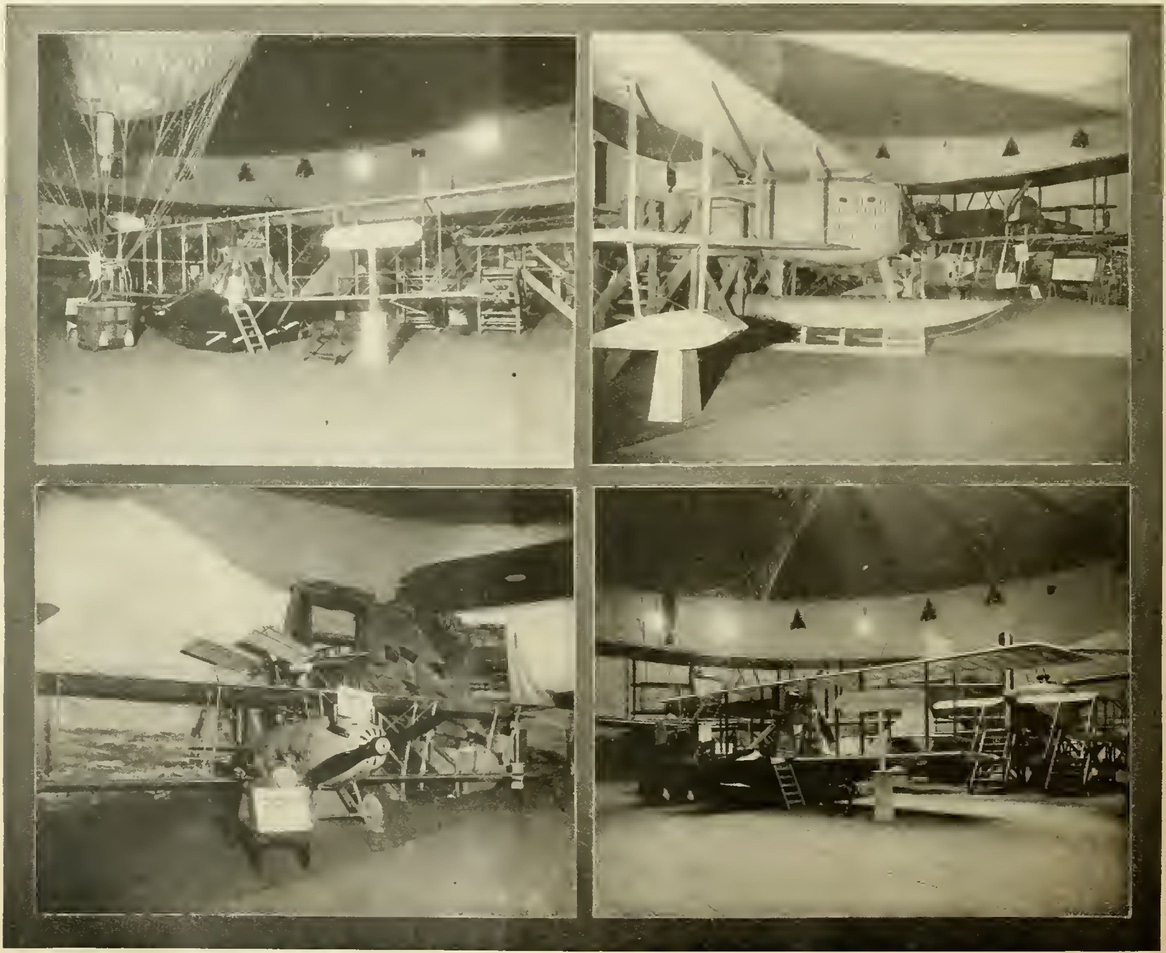
The Caproni Company is exhibiting a giant triplane which has been famous since 1915, when it made its first appearance. This triplane has a spread of 130 feet. It is equipped with three 400 H.P. engines, two of them in tractor position at the nose of the fuselage, and one a pusher at the rear of the central nacelle. This machine has climbed to an altitude of 14,000 feet with a ton of useful load and with only two of the engines running. The triplane was used as a bomber and carries a bomb compartment below the lower plane.

CURTISS AEROPLANE & MOTOR CORP.

(Garden, Center)

Curtiss J N 4 D

The J N 4 D Tractor shown by the Curtiss Company is shown with half the cover removed to illustrate the internal construction. All parts of the machine are finely finished and metal parts



Top (left) Curtiss M.F. Flying Boat, (right) Curtiss H.A. Hydroaeroplane. Bottom (left) Curtiss Model K Biplane, (right) Curtiss Flying Boat with Handley Page in the rear

nickel plated. A full description of the J N 4 D was published in the Aerial Age Weekly.

General specifications are as follows:

Span, upper plane	43′ 7″
Span, lower plane	33′ 11″
Wing chord, both planes	5′ 0″
Gap between planes	5′ 0″
Stagger	16″
Length overall	27′ 4″
Height overall	9′ 10″
Total controlling surfaces	352 sq. ft.
Net weight empty	1,430 lbs.
Gross weight, machine loaded	1,920 lbs.
Useful load	430 lbs.

Motor is model OX 5, 90 H.P. Speed range of 75-45 M.P.H. Climb in 10 minutes 2,000 feet.

The Curtiss M F Flying Boat

The Curtiss M F Flying Boat, a Sportsman's model, is the smallest of the Curtiss boats, a development of the popular "F" boat, carrying two persons side by side.

General specifications are as follows:

Span, upper plane	49′ 9″
Overall length	28′ 10″
Overall height	11′ 9″
Weight, empty	1,796 lbs.
Useful load	636 lbs.
Maximum speed	69 M.P.H.
Minimum speed	45 M.P.H.
Climb in 27 minutes	5,000 ft.
Maximum range	325 miles
Engine, Curtiss OXX	100 H.P.

The Curtiss H-A Hydro

The Curtiss H-A Hydro is a two-place single float seaplane. The upper wing has a dihedral of 3° and the lower plane a cathedral of 1°. Both planes have an incidence of 2°, and a sweepback of 4½°. In official tests by the Navy Department this machine has made a speed of 131.9 miles per hour with a full load. Its climbing speed is 8,500 feet in ten minutes.

The float is 20 feet long, 3 ft. 6 in. wide and 2 ft. 6 in. deep. It has three planing steps.

The horizontal stabilizer is adjustable during flight, within the limits of minus and plus 1°. The machine carries four machine guns; two fixed Marlins and two flexible Lewis.

The engine has a Liberty 12, giving 330 H.P. It is directly connected to a two-bladed propeller 9 ft. 2 in. in diameter, with a 7 ft. 7 in. pitch, or a three-bladed propeller 8 ft. 6 in. in diameter and 7 ft. 6 in. in pitch, depending upon whether speed or quick climb is required.

The general specifications are as follows:

Upper plane	30 ft. 0 in.
Lower plane	36 ft. 0 in.
Cord	72 in.
Maximum gap	70 5/36 in.
Minimum gap	55½ in.
Overall height	10 ft. 7 in.
Overall length	30 ft. 9 in.
Area, upper plane	184.8 sq. ft.
Area, lower plane	170.8 sq. ft.
Total supporting area	390 sq. ft.
Area of each aileron	8.6 sq. ft.
Total aileron area	34.4 sq. ft.
Horizontal stabilizer	25 sq. ft.
Vertical stabilizer	18.9 sq. ft.
Rudder	16.75 sq. ft.

Weights

Weight per sq. ft.	9.35 lbs.
Weight per H.P.	11.5 lbs.
Net weight, machine empty	2,638 lbs.
Weight, full load	1,012 lbs.

Performance

Speed range	62 to 131.9 m.p.h.
Climb	1,000 ft. per minute

DAYTON-WRIGHT AIRPLANE CO.

(Garden, Center)

De Havilland 4

The De Haviland 4 aeroplane exhibited by the Dayton Wright Airplane Company was the first De Haviland 4 battleplane to be built in America, having been completed October 29, 1917, at Dayton, Ohio. This machine has been in continuous service since that time and has been used in 2,500 flying tests of various kinds.

With this machine a distance of about 111,000 miles has been covered in a time of about 1,078 hours. Twenty-eight cross-country trips have been made in it, including Dayton to Washington, Dayton to New York, Dayton to Chicago, Dayton to Cleveland, etc., and in all its career no mishap has ever come to the machine.

The battleplane is exhibited with all its military equipment, including two Marlin machine guns fixed on the front cowling and fired through the propeller at a rate of 750 rounds at 1650 R.P.M. of the engine, and two movable Lewis machine guns at the rear cockpit which fire 650 rounds per minute. The wireless carried has a range of 11 miles to another aeroplane and a receiving radius of 47 miles by a ground station. A camera located to the rear of the observer is worked by means of wind vane. Photographs are taken at the rate of 24 per minute and magazine carries 6 dozen plates.

A full complement of 12 bombs are carried under the lower wings and flare lights for night landing are suspended from the wing tips. Red and green guide lights are carried on the lower plane and a white light is located on the fuselage deck, aft of the gunner.

The engine is, of course, one of the first Libertys to be built, and the fact that it is still in such good running condition speaks well for American manufacturing methods.

Dayton-Wright D 4-K

Two of these D 4-K De Havilland machines are being refitted to be used for carrying Government officers on important missions where speed is essential, and the machine is provided with conveniences which make it extremely comfortable, having all the luxurious equipment of the finest automobile. Such appointments as an enclosed weatherproof top, lunch compartments, robe rail, revolving seat and other accessories are provided.

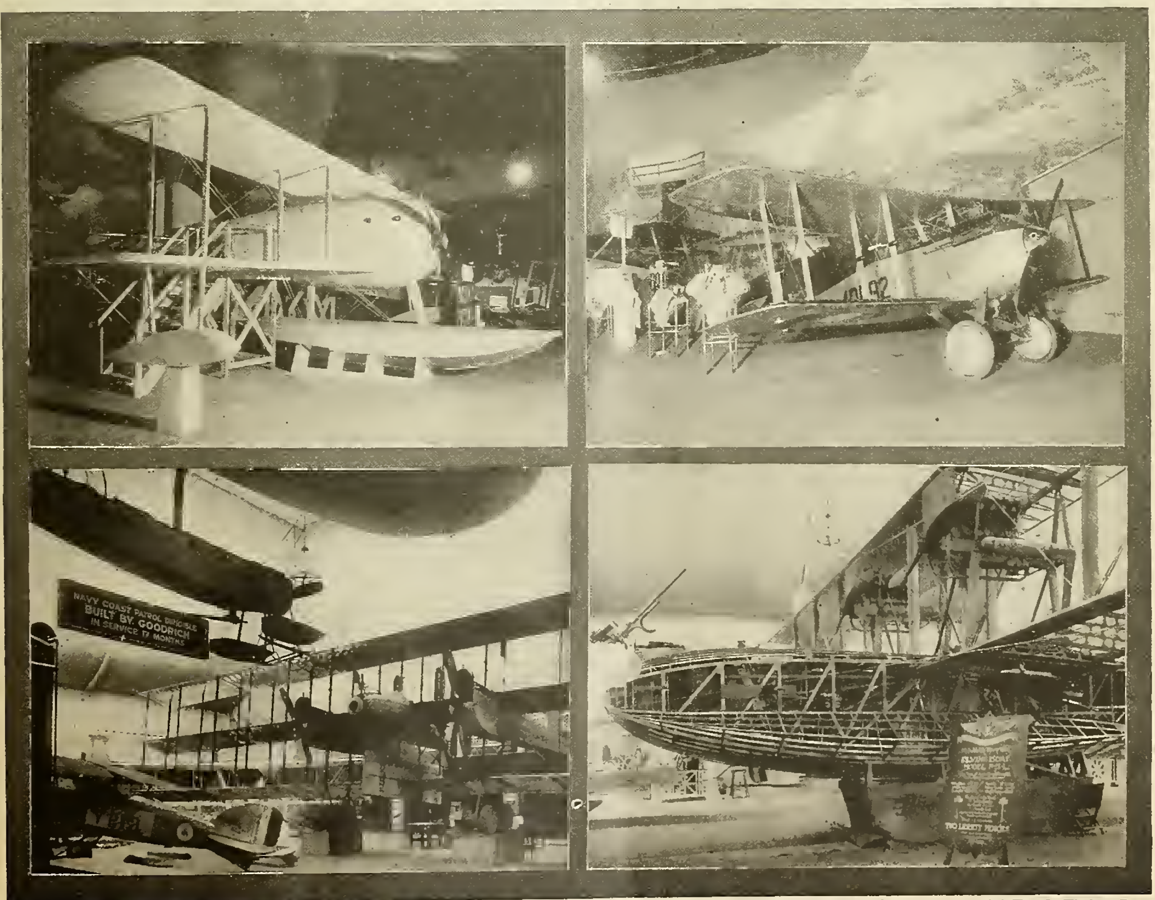
The speed of the D 4-K is about 115 miles an hour near the ground; low speed, 53 miles per hour. The climb is about 10,000 feet in 10 minutes, and the economical radius is four hours.

Dimensions are similar to the D H-4.

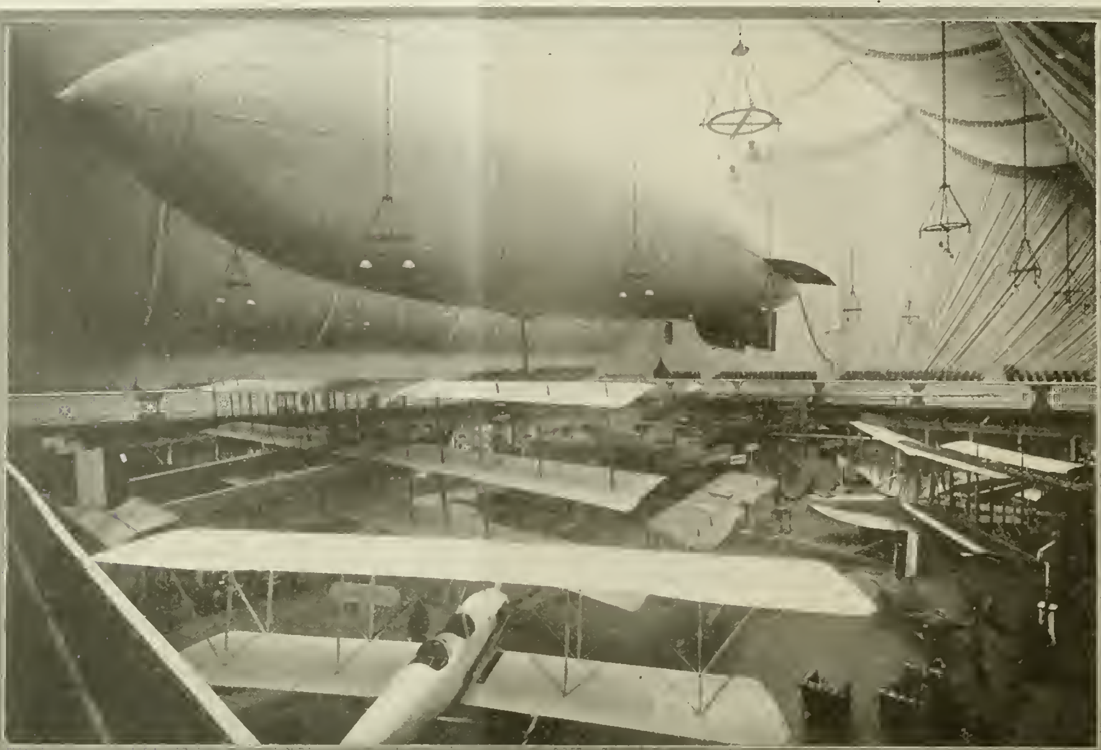
The T-4 Messenger

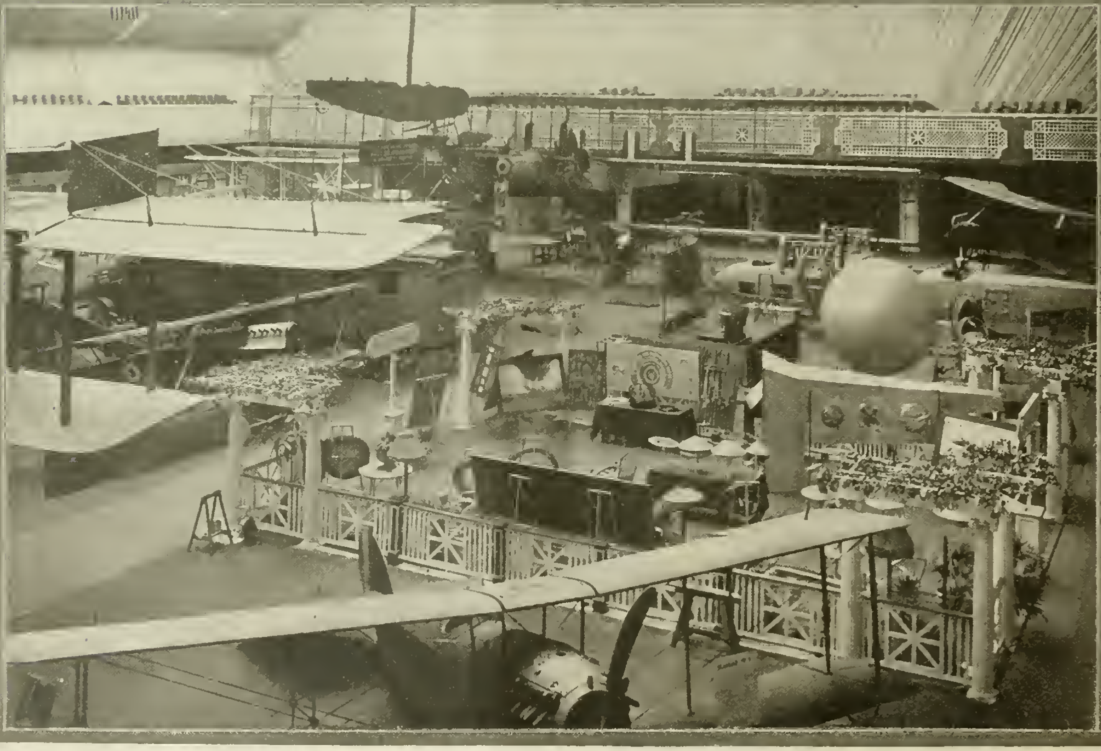
The "Messenger" was designed as a war machine, but after being modified in small details it makes an ideal machine for commercial and sporting purposes. As a war machine its use was to have been in carrying messages from the front lines to headquarters, and in general liaison work.

The machine is exceptionally light, and easy to

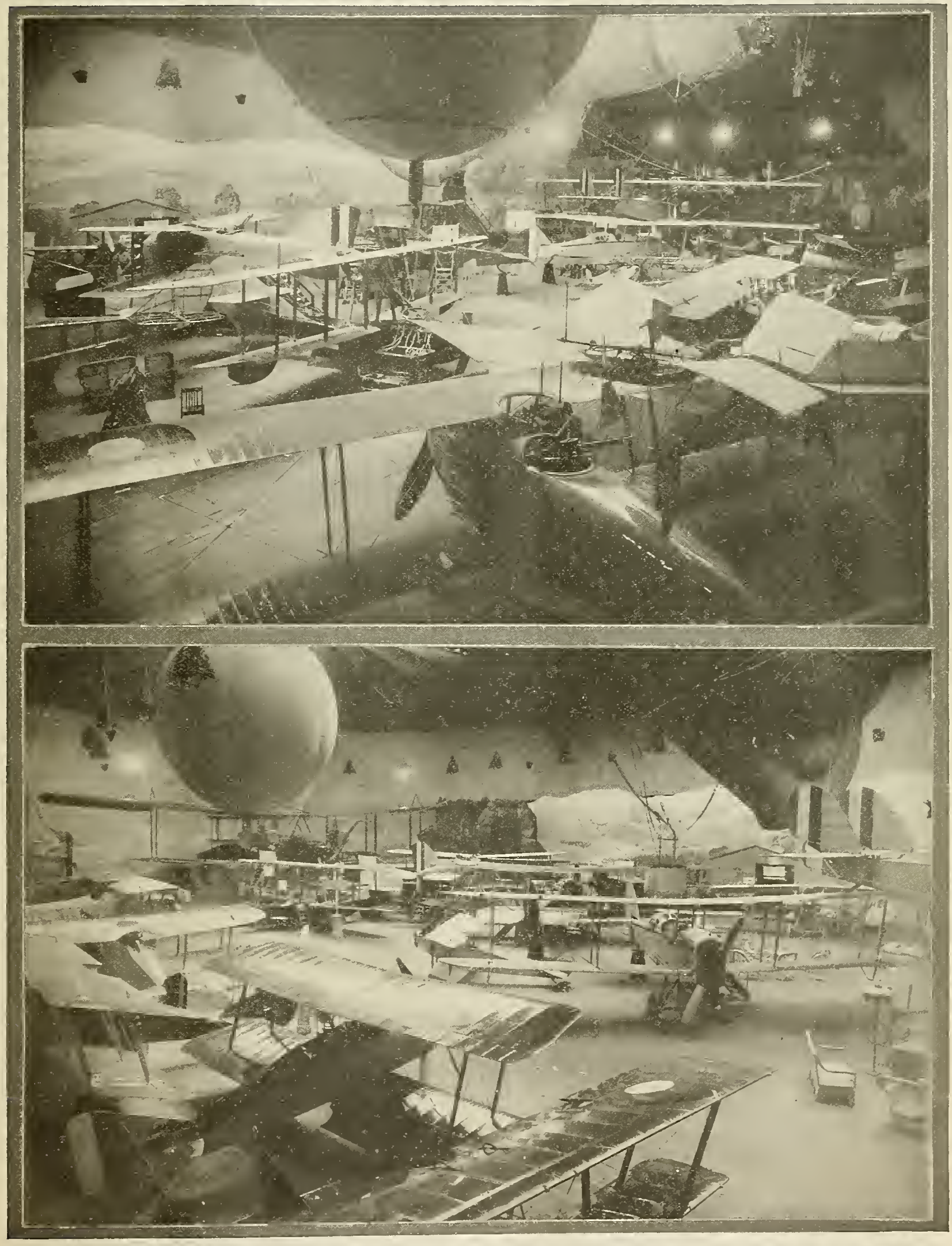


Top (left) Curtiss H.A. Seaplane, (right) Thomas-Morse M-B-3 Fighter. Bottom (left) Caproni Triplane, (right) Navy Model F-5-L Flying Boat





Two views in the 69th Regiment Armory, showing the excellent layout of the exhibits. The Naval dirigible presents an imposing appearance, and fills most of the air space. The immense size of the Caproni triplane is accentuated by the numerous ordinary sized machines placed around



Two views of the exhibits in Madison Square Garden. The machines are well set out to show the variety of types, and are accessible for close examination. The Glenn L. Martin Bomber and the Handley Page Biplane present imposing spectacles at the front and rear of the Garden respectively fly, making it possible to make landings in places that have been heretofore unaccessible. Very rigid flying tests have been made by Mr. Rinehart at Dayton.

The fuselage has absolutely no metal fittings nor tie rods of any sort, strips of veneer being used exclusively for the bracing.

As an example of its strength, the fuselage was supported at either end while 12 men stood at the center.

The machine comes within the means of the average sportsman, for its cost is said to be not much over $2,000.

General Specifications

Span, upper plane	19′ 3″
Span, lower plane	19′ 3″
Chord, both planes	3′ 3 9/16″
Area, upper plane	50 sq. ft.
Area, lower plane	56 sq. ft.
Gap	3′ 8½″
Stagger	9″
Length	17′ 6″
Height	6′ 1″
Angle of incidence	6°
Dihedral of lower plane	3°
Stabilizer incidence	½″
Weight unloaded	476 lbs.
Weight loaded	636 lbs.
Horizontal maximum speed	85 M P.H.
Landing speed	37 M P.H.
Climb in 10 minutes	3,000 f..
Engine, air-cooled De Palma	37 H.P.

The engine is a 4-cylinder air-cooled "V" type manufactured by the De Palma Engine Company of Detroit. Its weight is 3.7 lbs. per H.P. The engine consumes 4 gallons of gasoline per hour and tank has a capacity of 12 gallons. Oil is carried in the crankcase.

GALLAUDET AIRCRAFT CORP.

(Garden, Southwest Corner)

Gallaudet E-L 2 Monoplane

Striking originality in design is shown in the twin-pusher monoplane exhibition by the Gallaudet Aircraft Corporation. Mr. Gallaudet's 1919 Sport Model has a high factor of safety and is easily maintained.

Two stock "Indian" motorcycle engines are located in the nose of the fuselage, connected to a common transverse shaft and resting on the top of the plane, and driving twin pusher propellers on longitudinal shafts driven by bevel gears.

Engines are "oversize" models, giving 20 H.P. each at 2400 R.P.M. Weight, 89 lbs. each. Propellers are 3 bladed (2 bladed propeller on exhibition), 4' 8″ in diameter and 7′ 0″ in pitch. Propellers run at one-half engine speed, 1200 R.P.M.

The plane has a span of 33' 0" and a chord of 4′ 6″. Wing tip ailerons are 7′ 0″ long and 1′ 0″ wide. Wing section, modified R.A.F. No. 15. Dihedral, 178°.

The body is of monocque construction, 3-ply spruce being used. Two seats are provided, side by side, with single stick control.

Tail areas: Fin, 2 sq. ft.; rudder, 4; stabilizer, 12; elevators, 8.

Overall length of machine, 18′ 7". Special patented true streamline wires brace the wings. For adjustment and dissembling a rod from one cabane to the other permits slackening of the cables and removal of planes without loss of adjustment. Turnbuckles are therefore unnecessary.

Eight gallons of fuel are carried; sufficient for 2 hours.

With full load, a speed of 40-80 M.P.H. is attained. At present the machine weighs 750 lbs., but new features will permit a reduction in weight to 600 lbs.

Gallaudet D-4 Bomber

The Gallaudet D-4 Light Bomber was described in Aerial Age Weekly in the issue of January 6. This machine is powered with a Liberty motor driving a pusher propeller attached to a ring surrounding the fuselage. The D-4 actually made an official record of 110 knots (126.7 miles) an hour over a measured course. Other performance figures obtained by actual flight tests are as follows:

High speed	126 M.P.H.
Slow speed	42.6 M.P.H.
Slowest getaway	46 M.P.H.
Climb in 2 minutes	2,100 ft.

AERIAL AGE WEEKLY

(Elevated Platform—Garden and 69th Armory)

Aerial Age holds many distinctions, among them (1) that of having been the first publication in the United States to urge the creation of the Council of National Defense and having continued the campaign of national education which resulted fifteen months later in the creation of the Council and, subsequently, the creation of the Aircraft Production Board.

(2) That of having been the first publication to donate advertising space for the Mobilization of Industries, for Recruiting and for the Liberty Loans.

(3) That of publishing twice as much technical material and trade and news items as any other aeronautic publication.

(4) That of publishing weekly the complete official reports of the Army and Navy Air Services together with articles by the recognized authorities on Military and Navay aeronautics, thereby insuring to the reader a more complete representation of Army and Navy aeronautics than is afforded by any other publication in the United States.

(5) That of always publishing articles on technical developments written by authorities on the subject, refusing the purely theoretical essays of men who have not had actual experience in original research, in the factory or in the field, whose theories only lead to costly failures to those who adopt them.

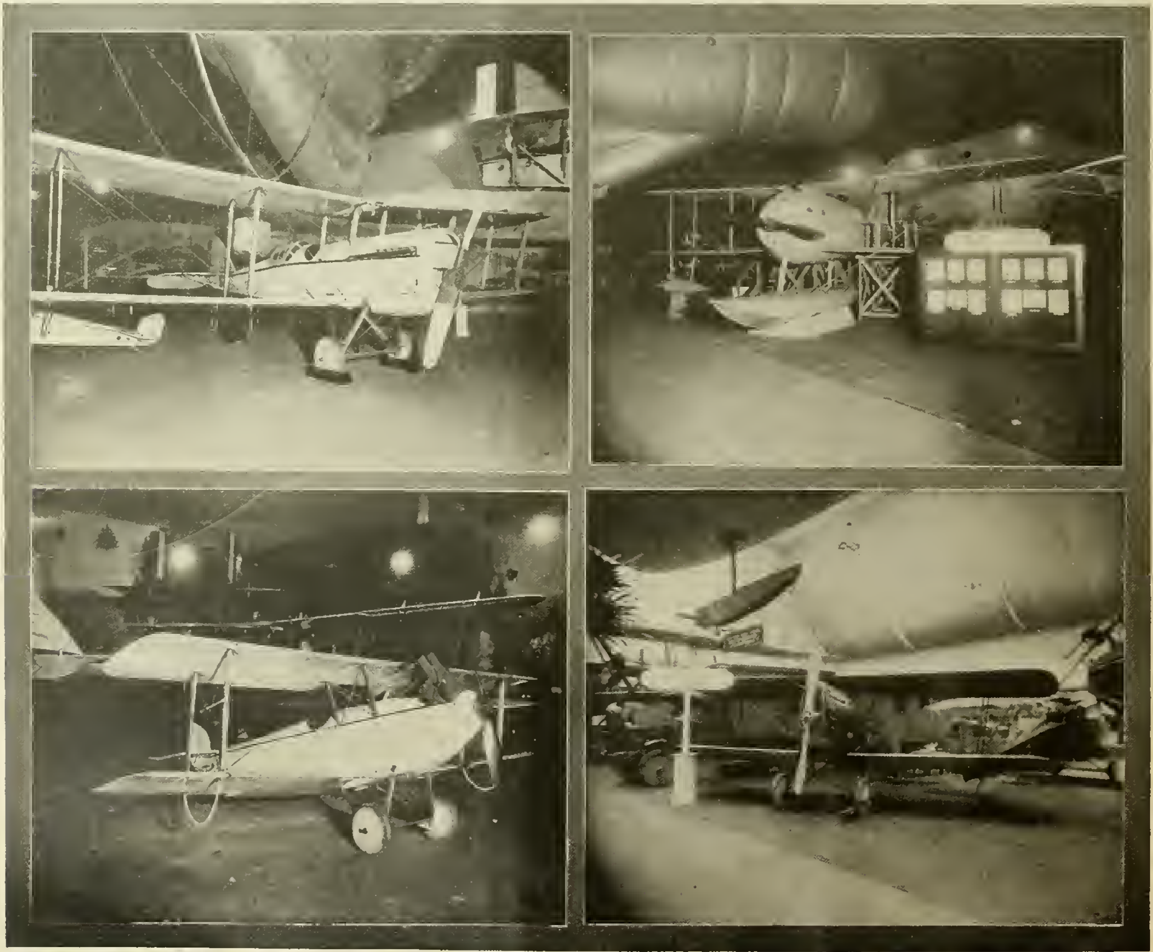
(6) The distinction of having carried a larger amount of advertising in 1918 than any other publication.

There are many other distinctions, but the above explains how Aerial Age became the National Technical Engineering and Trade Authority.

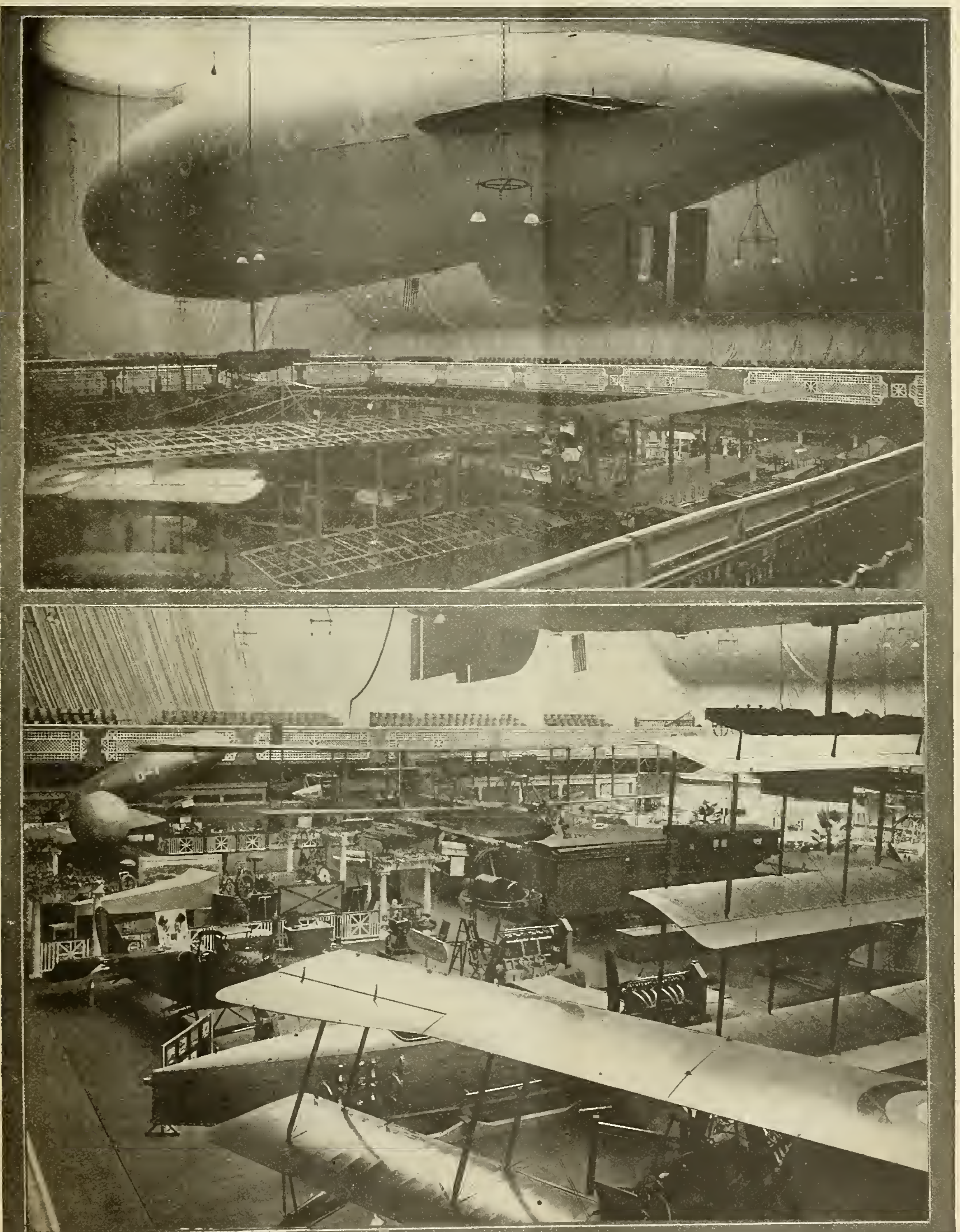
FLYING MAGAZINE

(Elevated Platform—Garden and 69th Armory)

Official publication Aero Club of America, Aerial League of America, Aero Club of Illinois, Aero Cub of Pennsylvania, Aero Club of New England, Aero Cub of Minneapolis, Pan-American Aeronautic Federation, National Special Aid Society, National Aerial Coast Patrol Commission, The Woman's Naval Service.



Top (left) Dayton-Wright D 4-K, (right) Curtiss Hydroplane. Bottom (left) Dayton T4 Messenger, (right) Ansaldo A1



Two views in the 69th Regiment Armory. The upper picture shows the large Naval flying boat, which attracts wide attention, and which being half stripped, half covered, amazes the spectators by showing them the enormous amount of detail in aircraft construction

THE L-W-F COMPANY

(Armory, Northeast Side)

The L-W-F Model V Tractor was described in Aerial Age Weekly of May 22, 1916. This machine, equipped with 125 H.P. Thomas engine, is convertible from a land machine to a hydro. The machine exhibited at the show has twin floats.

The L-W-F Company also exhibits one of the H S I L Coast Patrol Flying Boats with a 350 H.P. Liberty engine. The machine has a span of 62' and chord of 6' 3" and the total wing area is 653' including ailerons. Overall length is 38' 6" and overall height is 14' 7". The hull weighs 1,265 lbs. Gross weight 5,900 lbs. and weight empty 4,810 lbs. Fuel and oil 750 lbs. and crew 360 lbs.

Machine has a maximum speed of 91 M.P.H. and a low speed of 53 M.P.H. Climb in 10 minutes is 3,000 feet.

L-W-F Model G-2 Fighter

Model G-2 is a two place armored fighter carrying 7 machine guns and 4 bombs. Guns are arranged to be fired downward through an opening in the bottom of the fuselage.

The main specifications of the Model G-2 are as follows:

Dimensions

Span overall	41' 7½"
Chord, both planes	80"
Gap between planes	74"
Stagger	7⅛"
Length overall	29' 1¼"
Height overall	9' 4⅜"

Weights (pounds)

Weight, light (fighter)	2,675.5
Total, full load (fighter)	4,023.
Weight, light (bomber)	2,675.5
Total, full load (bomber)	4,879.5

Areas (sq ft.)

Total, supporting surface and ailerons	515.54
Net area of main planes	465.46
Upper planes, with ailerons	268.78
Lower planes	246.76
Stabilizer	29.15
Elevators	27.70
Fin	5.21
Rudder	12.65

Performance (Fighter)

Speed at 10,000 ft.	130 M.P.H.
Speed at low altitude	138 M.P.H.
Low speed	50 M.P.H.
Climb to 10,000 ft.	9 min. 18 sec.
Endurance at full speed	4 hours

The engine is a Liberty, giving 435 H.P. at 1700 R.P.M. Propeller, 9' 7" diameter; 7.38 ft. pitch.

THE GLENN L. MARTIN CO.

(Garden, Center, West)

The Martin Bomber

The Martin Twin Engine Bomber in its official test at Wilbur Wright Field, Fairfield, Ohio, has excelled any other record for a similar bomber either here or abroad.

A speed of 118.5 M.P.H. was made on the first trial with full bombing load. The climbing time with full bombing load was 10,000 feet in 15 minutes and a service ceiling of 16,500 feet was attained. As a military machine the Martin Twin is built to fill requirements of a night bomber, day bomber, long distance photographer, or a gun machine. As a night bomber it is equipped with 3 Lewis guns, 1,500 pounds of bombs and 1,000 rounds of ammunition. A radio telephone set is carried on all four types. Fuel capacity sufficient for 6 hours. Full power at 1,500 feet.

As a day bomber 2 additional guns are carried and the bomb capacity cut to 1,000 pounds. The Martin Twin is easily adaptable to commercial uses which are now practical; they are mail and express carrying, transportation of passengers, and aerial map and survey work. As an example of its capacity, 12 passengers or a load of merchandise weighing a ton may be carried.

General dimensions are as follows:

Span, both planes	71' 5"
Chord, both planes	7' 10"
Gap	8' 6"
Overall length	46' 0"
Overall height	14' 7"

With a ton of useful load speed of 100 to 150 M.P.H. is made. Two 400 H.P. Liberty engines are used.

PACKARD MOTOR CAR CO.

The Packard Aeroplane

(Garden, North, Center)

The Packard two-place tractor was designed around and made a complete unit with the Model 1-A-744 Packard Aviation Engine. This machine will make about 100 M.P.H. with full load, on occount of its light weight and clean-cut design, and yet its landing speed is as low as the average training aeroplane.

Fast cross-country trips are made possible in this ship, with the ability to land in relatively small fields. The general specifications are as follows:

Power Plant

Packard 8 cylinder 160 H.P. at 1,525 R.P.M. Weight, complete with hub, starter, battery and engine water, 585 lbs. Fuel consumption, .50 to .54 lbs. per H.P. hour at sea level.

Weights, Areas, etc.

Area, main planes	387 sq. ft.
Weight, machine empty	1,520 lbs.
Normal flying weight	2,167 lbs.
Weight, lbs. per H P.	13.5 lbs.
Wing loading, per sq. ft.	5.6 lbs.
Permissible extra luggage	100 lbs.

Performance (estimated)

Altitude (feet)	Speed (M.P.H.)	Time of Climb (minutes)	Fuel range (hrs.)
0	102	0	2.5
5,000	100.5	7.5	3
10,000	98	18.1	3.5
15,000	90.5	34.5	4

Absolute ceiling, 19,500 feet.

STANDARD AERO CORPORATION

Handley Page Bomber

(Garden Rear Center; Armory, S-W Side)

The American built Handley Page shown at the Garden is similar to the British, except that Liberty "12" 400 H.P. engines are employed in the former and the Rolls-Royce or Sunbeam in the latter. Accommodations are made for one pilot and two or three gunners and an observer, who operates the bomb dropping device. Two guns are located at the top of the fuselage and a third is arranged to fire through an opening in the under side of the fuselage, and a pair of flexible Lewis machine guns is operated at the forward end of the fuselage. One gunner may have charge of all rear guns although usually two gunners man them.

Top (left) Glenn L. Martin Bomber, (right) Gallaudet E-L2 Monoplane. Bottom (left) Aeromarine Model 50 Flying Boat, (right) Dodge Mfg. Veneer De Havilland Aeroplane parts

sketches made from life
at AERO SHOW
by Norman E. Jennett
1919

The general dimensions of this machine are as follows:

Span, upper plane	100' 0"
Span, lower plane	70' 0"
Chord, both planes	10' 0"
Gap between planes	11' 0"
Length overall	62'10"
Height overall at overhang cabane	22' 0"
Height overall at center panel	17' 6"
Width, wings folded	31' 0"
Machine empty	1,566 lbs.
Machine loaded	14,300 lbs.

Each of the two engines give 400 H P., at 1,625 R.P.M.

Speed at ground, 92 M.P.H.

The "E-4" Mail Aeroplane

(69th Regiment Armory)

The "E-4" Mail Plane, built by the Standard Aero Corporation, is particularly adaptable to the work of carrying mail because of the special features of its design. The machine exhibited has seen considerable service, having been brought directly to the show after completing one of its regular mail carrying trips.

The engine is a Wright-Martin Model 1 Hispano-Suiza, giving 150 H.P. at 1,500 R.P.M., and 170 H.P. at 1,700 R P.M. The model I is an 8 cylinder V type with a bore of 120 mm. (4.724") and a stroke of 130 mm. (5.118").

General specifications of the "E-4" are as follows:

Span, upper plane	31' 4¾"
Span, upper plane with overhang	39' 9¾"
Span, lower plane	31' 4¾"
Chord, both planes	6' 0"
Gap between planes	5' 6"
Stagger	5¼"
Length overall	26' 2"
Height overall	10' 10 3/16"
Machine empty	1,566 lbs.
Machine loaded	2,400 lbs.
Machine loaded with overhang	2,450 lbs.
Stalling speed	50 M.P.H.
Gliding angle	1 to 8
Dihedral	3% or 1¾°

The speed at ground is 100 M.P.H.

THE THOMAS-MORSE AIRCRAFT CORPORATION

(Garden, North Section, Center)

Four aeroplanes shown by the Thomas-Morse Company: the Type S-6, S-7, S4-C Scout and the M-B-3 Fighter.

The M B-3 Fighter is equipped with a 300 H.P. Hispano-Suiza Engine. It is a single seater, and is said to be the fastest climbing aeroplane in the world.

The S4-C is an 80 H.P. Le Rhone Scout, used for advanced training. It has been used at most of the army training schools throughout the United States.

The S-6 is a Tandem 2 seater, very similar to the S4-C in general appearance. With an 80 H.P. Le Rhone, this machine has a speed range of 35-105 M.P.H. In 10 minutes, its climb is 7,800 feet.

The S-7 is a side by side tractor with an 80 H.P. Le Rhone engine. The side by side seating makes it especially desirable for pleasure flying. The cockpit contains numerous comforts and conveniences.

The principal dimensions and specifications of the S-7 are as follows:

Span, both planes	32'
Chord, both planes	5' 6"
Incidence angle	1½°
Gap between planes	4' 6¼"
Overall length	21' 6"
Stagger	34% of Chord
Weight, loaded	1,480 lbs.
Weight per square foot	4.25 lbs.
Climb in 10 minutes	6,700 feet
Maximum speed	90 M.P.H.
Minimum speed	35 M.P H.
Low flying speed	40 M.P.H.

THE UNITED AIRCRAFT ENGINEERING CORPORATION

(Armory, N-W Section)

This Company is showing a Canadian-Curtiss training plane, such as used by the Royal Flying Corps for instruction in Canada and England.

A number of Curtiss OX-5 100 H.P. engines are also on display, together with other equipment, which the Company has purchased from the Imperial Munitions Board of Canada.

UNITED STATES ARMY

Langley Experimental Flying Machine

(Garden, North-rear)

The model of the Langley aeroplane is a copy of the original Langley Flying Machine, which is now in the United States National Museum at Washington, D. C. This machine made the first successful flight by heavier-than-air machine driven by its own power. The machine was launched May 6, 1896, at Quantico, Va. It rose to a height of 70 to 100 feet and travelled half a mile at 20 to 25 M.P.H., with propellers revolving at 1,500 R.P.M.

The total weight of the machine is 26 pounds. It is driven by a single cylinder engine, using gasoline as fuel.

Foreign Aeroplanes

Among the foreign aeroplanes sent to the Aero Show by the War Department are the French Spad *(rear, Garden)*, French Nieuport *(Front, S. W. cor. Garden)*, British SEV and a German Albatross D11 *(center, Armory)*.

The Spad is a single seater scout with a Hispano-Suiza Engine.

The Nieuport Single Seater is equipped with a rotary Gnome Engine.

The SEV, which was put into limited production in the United States, has a Hispano-Suiza Engine.

The Albatross Scout was one of Germany's best fighters. It has a Mercedes Engine.

U. S. Army

In addition to exhibiting military aeroplanes the War Department is featuring the recent developments of radio telephony as a part of their exhibit. Under the supervision of Lieutenants Woolfolk, Shangraw and Adams, visitors are permitted to "listen-in" while aeroplanes above are being directed by voice command. It is thereby possible to hear the orders, just as the aviator in the plane hears them. An SCR-67 set is used for radio-telephone transmission and reception. Other sets on view are the SCR-57, an interphone for communication between aeroplane occupants; SCR-73, the 200 watt spark set, equipped with rotary gap, which was used for the direction of artillery fire with remarkable success; SCR-72, the two step amplifier, which increases a faint signal to one of extreme loudness; the SCR-81, a direction finding outfit, and numerous others.

On the balcony of the Garden, the Department of Military Aeronautics is exhibiting some remarkable photographic maps or "mosaics" which attracted general attention. There are also photographs showing the work of the military photographer, taking photographs, developing, printing, mounting in mosaics, and comparing them with other maps. A mosaic covering the territory between Fort Sill and Wichita on a scale of 10,000 to 1, having an area of over 35 square feet is an interesting example of the work done by the military photographer.

UNITED STATES NAVY DEPARTMENT

(Armory, West Center)

The F-5-L Flying Boat

The F-5-L, constructed by the Naval Aircraft Factory at Philadelphia, has a span of 107 feet, wing chord of 8 feet, and an overall length of 50 feet.

Two 400 H.P. Liberty Engines are used, connected to tractor propellers 10' 6" in diameter. 500 gallons of gasoline are carried, sufficient for a duration of 10 hours at full speed, near sea level, and a speed of 102 M.P.H. is maintained.

Fully loaded the machine weighs 14,000 lbs. This weight includes a crew of 5 men; 1 Davis and 4 Lewis machine guns; 4 230 lb. bombs; radio apparatus; telephone system with 6 stations; carrier pigeons; and 500 gallons of gasoline.

The machine is exhibited with one half covered and the other half exposed to show the interior construction.

In the making of this machine there are 6,000 distinct pieces of wood, 50,000 wood screws, 46,000 nails, braces and tacks, and 4,500 square feet of cotton fabric. The hull requires 600 square feet of veneer. The 250 pieces of steel tubing total 1,000 feet in length. 5000 feet of wire and cable, 500 turnbuckles, 1,500 each of bolts, nuts, and washers, and 1,000 metal fittings are necessary in the construction of this flying boat.

Navy M-2 Baby Seaplane

The M-2 Seaplane designed by the Navy Department and built by Grover Cleveland Loening, was to have been used for submarine patrol work. It is the smallest seaplane ever built, and its size has gained for it the name of "molecule." It is easily set up and, occupying so little space, can be stored aboard a submarine.

The machine is a tractor monoplane with twin floats. The plane has a span of 19', a chord of 4', and a total wing area of only 72 square feet. The wing section is a modified R.A.F. 15. Overall length of machine 13'.

The floats are 10 feet long and weigh 16 lbs. each. They are constructed of sheet aluminum with welded seams. The interior of the floats is coated with glue and outside is not painted but coated with oil. Experiments have proven this practice to be most efficient in preventing corrosion. Mr. Loening's experiments have proven that paint applied to aluminum causes a corrosive galvanic action. Floats have exceptional reserve buoyancy; with machine at rest on the water it is impossible to overturn machine by standing on the wings near the tips or by standing on the rear of the fuselage.

The engine is a 3 cylinder Lawrance 60 H.P. air cooled engine, driving a 6' 6" propeller with a 5' pitch. 12 gallons of gasoline and 1 gallon of oil are carried, sufficient for 2 hours' flight. Fully loaded with pilot and fuel the complete machine weighs but 500 pounds. The maximum speed is about 100 M.P.H., and the low speed is 50 M.P.H.

Helium Filled Model Airship

The model dirigible exhibited by the Navy Department is inflated with Helium, which would have cost one million dollars a year ago, and which now can be produced for about $100. It is through the wonderful discovery of Helium that the dirigible balloon will make great development. Its cost is at present about 10 cents per cubic foot and later it will cost even less. The remarkable feature, however, is the fact that it is not inflammable, and therefore one of the greatest drawbacks of lighter-than-air craft is overcome.

Another item that is of interest is the fact that this model dirigible, 32' long and 7' in diameter, contains more Helium than has ever been placed in an envelope of any kind. In spite of the chemical process that makes it non-inflammable, Helium contains 85% of the lifting power of Hydrogen.

The army and navy controls the entire sources of supply of this gas. Stations in Kansas and near Fort Worth, Texas, will soon produce about 2 million feet of Helium per month.

Astra-Torres Dirigible

The dirigible car shown by the Navy Department is from a ship of the "Astra-Torres" type. The airship was built by the French in 1916 and turned over to the Americans in March, 1918, at Paimboeuf, France, the American Naval Station commanded by Commander L. H. Marfield, U.S.N. It was used until November, 1918, for coast patrol on the west coast of France.

The car is 45 feet long, 6 feet wide and 7 feet high. The envelope (which is not exhibited) is 221 feet long and 47 feet in diameter, having a capacity of 252,000 cubic feet. Speed, 45.5 miles per hour. With a crew of Americans, this ship has stayed aloft for 25 hours 40 minutes. At its cruising speed of 45.5 miles, the endurance is 10 hours.

The car accommodates a crew of 12. At the front, the pilot controls the side-to-side movements of the ship. Behind him is the bridge from which the altitude and trim are controlled by a pilot, and the engines controlled by the Commanding Officer. Upon the bridge are numerous instruments for navigation. Below and aft of the bridge is the chart room, about 6 feet square, also used as a dining room. Next is the blower motors and blowers for maintaining the pressure and trim of the envelope.

A passageway runs through the center of the car, and four fuel tanks and two water ballast tanks are located at either side. Aft of the tanks are the bomb racks, holding four 150 lb. bombs, and at the stern is the radio room. Two 150 H P. Renault engines with two-bladed tractor propellers are used. They are placed on outriggers. Two Lewis machine guns are carried.

This ship is one of several large dirigibles purchased by the United States Navy and brought to this country for the purpose of development.

U. S. Navy

In addition to the seaplanes and dirigibles exhibited by the Navy, which are described under another heading, there can be seen at the Navy booths in the Armory almost every type of aerial ordnance used during the war, including the Davis non-recoil gun, two captured German Spandau machine guns, etc. A great many aeroplane motors of various types, manufactured for the Navy, are mounted on test stands, in the same manner as they can be found in Navy instruction schools.

Several types of radio equipment are in evidence, developed by the Bureau of Steam Engineering. On the dirigible car of the Astra-Torres type, described under another section, is a French radio set, which saw considerable service during the war.

Another feature of interest is the pigeon loft, containing thirty pigeons which were used to carry distress signals from pilots downed at sea. Some of these pigeons had war records consisting of more than six months' overseas service.

Numerous excellent photographs supplement the complete exhibit, showing all phases of the work of the naval aeronaut.

The Ansaldo Exhibits at the Aeroplane Show

IN the center of the 69th Regiment Armory the firm of Gio Ansaldo & Co., of Genoa, Italy, exhibits two sister machines, which represent the most original and advanced developments in Italian aviation, and are the more interesting because of their glorious achievements in the war. They are the S. V. A. and the Ansaldo I, the latter better known by its nickname of "Balilla," a popular Italian hero.

Designers of the S. V. A.

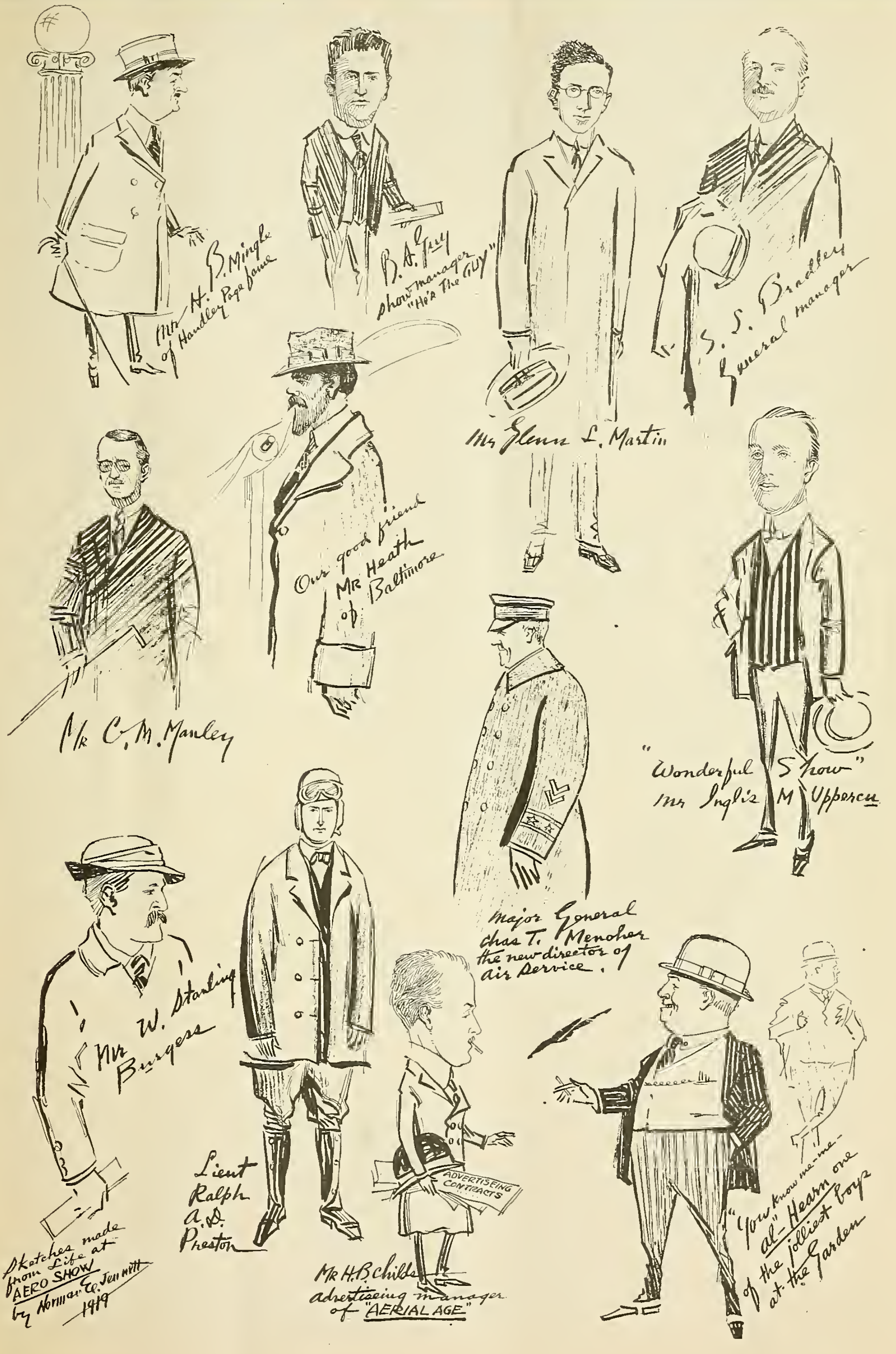
The first of these machines to appear was the S. V. A. It was designed by two officers of the Technical Branch, Italian Aviation Service, Colonels Savoia and Verdusio, whose initials give the first two letters to the name of the machine.

The builder was the great Ansaldo Company of Genoa, a concern having over 150 million dollars capital and which, during the war, turned all its activities to the manufacture of guns, ammunition, ships, all kinds of war materials and machinery—including the most modern one, the aeroplane. And Ansaldo's initial accounts for the third letter in the name.

Aim of the Designers

The S. V. A. was designed with the determination of embodying the latest and soundest prin-

(Continued on page 1364)


Mr H. B. Mingle of Handley Page fame
B. A. Gruy show manager "He's The GUY"
Mr Glenn L. Martin
S. S. Bradley General manager
Our good friend Mr Heath of Baltimore
Mr C. M. Manley
"Wonderful Show" Mr Inglis M Uppercu
Major General chas T. Menoher the new director of air Service.
Mr W. Starling Burgess
Lieut Ralph A.D. Preston
ADVERTISEING CONTRACTS
Mr H.B. Childs advertiseing manager of "AERIAL AGE"
"You know me-me- al" Hearn one of the jolliest boys at the Garden

Sketches made from Life at AERO SHOW by Norman E. Jennett 1919

MISCELLANEOUS EXHIBITS

AERO INSTRUMENT CORPORATION

(Garden, Balcony, Right)

The Aero Instrument Corporation of New York City are manufacturers of accurate aero altimeters, clocks and temperature-recording barometers and speedometers. The characteristic feature of this altimeter is its supreme accuracy, which is obtained by eliminating the chain drive, now almost universally used. This is replaced with three ingeniously designed cams so arranged as to cause the indicating needle to move the same distance per thousand feet at all altitudes, eliminating the cramped scale at the higher altitudes. This company manufactures altimeters reading as high as 35,000 feet, with extremely high accuracy.

The chief engineer of this company, who designed this altimeter, is Mr. Albert Bourrieu, formerly chief engineer of the Companie Francaise, famous makers of electric meters and precision instruments and chief of fabrication of the Electric Light Company of Paris. Mr. Bourrieu is well known as the inventor of the taximeter, universally used as the fare-recording device on taxicabs.

An extremely delicate indicating recording barometer and altimeter, which the Aero Instrument Company has brought out, gives the aviator's performance without possibility of error. The clockwork which operates the device is readily adjusted to turn the recording cylinder around in any length of time between one hour and twenty-four hours. The construction of the instrument does not permit the appearance of a magnetic field through its parts to affect the accuracy of the readings.

ACIERAL PRODUCTS CO.

(Garden, Space 123-124)

The Acieral Products Company is displaying its light weight pistons, which are 2½ times lighter than cast iron and have more than double its heat conductivity. The Acieral Casting composition is said to overcome the usual imperfection of sand holes, porosity, shrinkage cracks and permits of high polish finish.

AIRCRAFT ENGINEERING CORPORATION

(Garden, Space 506)

The Aircraft Engineering Corporation of New York's exhibit consist of models and photographs of the ACE plane, designed for the use of the aerial sportsmen, to sell at a price of $2,500. The enthusiasm with which this exhibit is greeted serves as a barometer of the desire of people for a small low-cost flying machine. Demonstrations are being given daily at the aerodrome at Central Park, Long Island, which emphasizes the safety and simplicity of the machine. The plane lands at a speed of only 30 miles per hour, and owing to its light weight and construction, comes to a stop within 50 feet of where it strikes the ground. Its fuel consumption is only four gallons per hour, while its flying speed is sixty miles an hour. Its simple and rigid construction makes it one of the pioneer machines for the civilian aeronautic enthusiast.

AJAX AUTO AND AERO SHEET METAL CO.

(Garden, Space 612-613)

The Ajax Auto and Aero Sheet Metal Co. of New York are exhibiting several models of their honeycomb radiators, which have been used on L. W. F., Aeromarine and Standard aeroplanes. The manufacturers state that the high cooling efficiency of their radiators is due to the fact that all four sides of the water tubes contribute to the cooling of the water within.

AMERICAN BALSA CO.

(Armory, Space 631-634)

The American Balsa Co. of New York City, by treating balsa, a wood imported from Costa Rica and Panama, with the Marr process, is able to produce a wood having a weight only one-fourth that of spruce yet possessing one-half of its strength. It is especially adapted for instrument boards, fuselage beams, flooring, seats and other parts not requiring great strength. The extreme bouyancy of balsa was utilized in the construction of life rafts for transports. A pair of balanced scales show that 12½ times the cubic quantity of balsa were required to counterbalance a unit block of iron.

AMERICAN BOSCH MAGNETO CO.

(Garden, Space 201-206)

The American Bosch Magneto Co. are exhibiting their complete line of magnetos ranging from 1-cylinder to 18-cylinder equipments, mounted on display stands with hand-operated cranks. Although this company's production was largely confined to magnetos for motor trucks and cars, tanks and other vehicles, they are prepared to manufacture magnetos for aircraft motors of all sizes.

AMERICAN PROPELLER & MFG. CO.

(Garden, Space 108-109)

The extensive facilities of the American Propeller Co., of Baltimore, Md., were fully utilized in the war program. This company manufactured all types of propellers, from the small air-fan used in driving generators for heating, lighting and radio, to single, two, three and four-blade air-screws for fighting and bombing planes. This company's exhibit consists of various types of propellers made for the government program.

A-C SPARK PLUGS

(Garden, Space 514)

When the armistice was signed, the Champion Ignition Company, makers of A-C plugs, were producing 40,000 plugs daily for aircraft alone. Besides this, this firm was making spark plugs for ordnance tanks and trucks. Every standardized Class "B" truck was originally equipped with A-C Titan plugs.

When America entered the war spark plug production was not sufficient for our program. Mica insulated plugs were being used abroad on French, British and Italian planes, but the individual skill required in the manufacture of such plugs made quantity production difficult. Plugs made of wrapped mica and with mica washers, moreover, are not easily duplicated. Only a small percentage of them pass inspection.

To fill the need, it was necessary to produce a porcelain plug, which would be adapted to quantity production. Working in conjunction with engineers of other companies, the Champion Ignition Company collaborated in the development and design of a porcelain spark plug which would withstand the high temperatures to which an aviation motor is subjected. The results obtained in tests of these plugs as compared with those of foreign make reflected most favorably on American design and manufacture.

The BRISTOL CO.

(Garden, Space 333)

The Bristol Co. is manufacturer of high grade gauges and measuring instruments. Their exhibit consists of several of their air speed indicators and water ballast gauges, which indicate the amount in inches of water remaining in the ballast tank, as used on dirigibles.

BUDD WHEEL CO.

(Armory, Space 607-609)

Wire wheels for aircraft of all sizes and types for large and small planes are being exhibited by the Budd Wheel Company. Strength, simplicity and rigidity of construction are outstanding features of the design of their products.

COLD LIGHT MFG. CO.

(Garden, Space 520)

The Cold Light Company of New York City, manufacturers of "Marvelite" luminous paints, are exhibiting various indicating devices to which their luminous paint had been applied, including compasses, clocks, tachometers and gauges. Charts, illustrating the process of manufacture from the mine to the finished product, vividly depict the great engineering skill required to produce a truly luminous paint. This material is a mixture of a very small amount of radium with a base which is rendered luminous by the action of the radium. Marvelite is truly a radioactive material and is not dependent on phosphorescence for its luminosity. It therefore remains luminous indefinitely and does not lose its brilliance after short radiation in darkness. Phosphorescent materials may appear brilliant for a short time in the dark, but they lose their luminosity when the light absorbed during daylight has been radiated.

COLLEGE OF THE CITY OF NEW YORK

(Garden, Balcony, Center)

The College of the City of New York is conducting several courses for aeronautic mechanics and engineers, full information regarding which is published elsewhere in this issue. The school has $85,000 worth of aeronautic equipment.

CONNECTICUT AIRCRAFT CO.

(Garden, Space 127-131)

The Connecticut Aircraft Company of New Haven, Conn., are displaying several detailed models of the various types of lighter-than-air ships which they have manufactured. They are also exhibiting a model of a huge passenger dirigible of 300,000 cubic foot gas capacity, to be propelled by two 400-horsepower motors, to carry twenty passengers. This company manufactured Type "R" kite balloons, U Type dirigibles and the "Solo" free balloon having a capacity of 18,000 cubic feet.

DAYTON ELECTRICAL ENGINEERING LABORATORIES

(Garden, Space 517-519)

A complete line of Delco Ignition Products, both of Delco design and those made to Government specifications are being exhibited at the Delco booth. The Delco Company has been manufacturing generator-battery-distributor ignition systems for the automobile industry in huge quantities, so that their design and manufacturing experience were of great value in securing adequate production for aviation purposes during the war. Every Liberty motor was equipped with ignition of this type, and the Delco Company contributed largely to national production. A complete Liberty "12" ignition system is on display as manufactured by this company to Government specifications.

Delco equipment for the Packard aviation engine of 8 and 12 cylinder type and for the Lorraine-Didietrich motor, as manufactured for the French Government, are to be seen at the Delco booth.

For those interested in testing equipment there is a complete ignition inspector's outfit, including apparatus to determine the angularity of spark occurrence.

DAYTON WIRE WHEEL CO.

(Armory, Space 614-615)

The Dayton Wire Wheel Company are among the foremost manufacturers of wire wheels for motor cars and aeroplanes, and they have produced wheels in large quantities for the aircraft industry for training and war planes. Their exhibit includes wheels for the lightest and heaviest aircraft of both single and twin type.

DETROIT ACCESSORIES CO.

(Garden, Space 501)

This company's contribution to the aircraft industry consists largely of motor pump parts of light weight and great strength. Their exhibit includes motor pumps complete and dissembled.

DODGE MANUFACTURING CO.

(Garden Exhibition Hall)

The Dodge Manufacturing Company's exhibit shows laminated plywood, which is used in fuselage construction, in small and large sheets, from the thin, light material used in fuselage construction to the large multiple-ply planks from which the stouter parts are made. Wing-ribs, struts, spars, engine bearers and all the essential parts of the aeroplane are shown, as made for actual machines.

The greater part of the structural framework and body covering of the DeHaviland-4 planes were made of plywood and a complete fuselage of this company's construction was on view. Trussed members of laminated plywood have replaced the metallic aluminum for the framework of rigid dirigibles, the use of the non-inflammable hydrogen having eliminated the danger of fire.

The successful use of pylwood helped to solve the spruce problem, since any available wood may be used without long-distance transport, delays in seasoning, and difficulties from twisting and winding grain.

DOEHLER DIE CASTINGS CO.

(Garden, Space 207-208)

The Doehler Die Castings Co. of Brooklyn and Toledo are displaying numerous high-grade aluminum and alloy castings, which they have turned out in large quantities for the aircraft industry. Parts for Liberty and Curtiss motors, magneto housings, parts for Lewis guns, including the spiral guide for bullets in the magazine, camshaft and crankshaft bearings and scores of others are on view. This company has developed a process of babbitting on aluminum, thus permitting great strength of bearing surface without undue weight. This babbitt-lined aluminum bearing, known by the trade name of "Do-Lite," is used on Curtiss V-type 210-horsepower motors, the King-Bugatti motor, manufactured by the Duesenberg Motors Corporation, and the Liberty motors, as well as by several motor car manufacturers. This company makes all types of aluminum, brass, bronze and white metal for quantity production.

DUDLEY LEE TENNY CO.

(Garden, Space 334)

This company is exhibiting a reinforced steel propeller which has just been brought on the market. It is claimed by the manufacturers that this propeller can be produced in any strength and weight, that it will not flutter owing to the heavy leading edge and is unaffected by climatic conditions.

Sketches made from life at AERO SHOW by Norman E. Jennett 1919

DUESENBERG MOTORS CORPORATION

(*Armory, Space* 648-655)

The Duesenberg Model H motor, manufactured by this company and described in detail in the January 27 issue of Aerial Age Weekly, forms the chief center of interest at the booth of the Duesenberg Motors Corporation, of New Brunswick, N. J. This is a 16-cylinder motor, developing 850 horsepower. Another motor which this company manufactured for war purposes is the King-Bugatti motor, also described in detail in Aerial Age Weekly on February 10. Several other motors, including the Model A, 4-cylinder, 150-horsepower motors, are being exhibited by this company.

EASTMAN KODAK COMPANY

(*Garden,. Space* 511)

The Eastman Kodak Company, of Rochester, N. Y., is displaying a complete line of aeronautic cameras, suitable for military and mapping purposes. An interesting feature of their exhibit is the "photographic gun," used to train aviators in aerial marksmanship, which is mounted on the standard gun ring. The aviator, instead of firing bullets, snaps photographs of his mark and upon development of the film a record is obtained of the number of bulls'-eyes obtained and the accuracy of aim. This device has resulted in the saving of considerable ammunition for training purposes.

The cameras include hand-held types and types requiring special mounting, for both roll films and plates. Simplicity of operation, convenience of loading and ease in aiming and handling is a feature of every camera manufactured by the Eastman Company. Their extensive experience and resarch in orthochromatic and panchromatic photography, in the manufacture of lenses and shutters, in all types of roll films and plates, combined with the information which was placed at the disposal of our air services by our allies, resulted in the development of aerial photography and apparatus to a very high plane.

The Model A-1 camera, having a capacity of twelve 4x5 plates or Eastman cut film, is a type which will undoubtedly find favor among aerial photographers. It is equipped with a 10-inch Hawk Eye lens having a fixed aperture of f4.5 and a shutter capable of adjustment through a speed range of 1/120 to 1/450 of a second. In common with all Eastman aerial cameras, a safety shutter as a protection to mist, fog and dirt is provided, which opens only when the exposure is made. The loading is extremely simple and a new magazine can be attached in an instant. The camera is sighted directly at the object and a slight pressure of the thumb lever release opens the safety shutter, exposes the lens and makes the exposure. One short quick turn of a lever advances the film and resets the shutter.

Two types of cameras for photographic mapping, one hand mounted and the other for fixed mounting on a special rack, make the production of photographic maps almost automatic. Flying at definite altitudes, so that the negatives are made to scale, it is possible to fit the prints or enlargements together with sufficient accuracy to produce photographic maps of considerable accuracy over wide areas. A photographic map of the city of Rochester made in two and a half hours shows how effectively, speedily and accurately photographic mapping can be done.

EDISON ELECTRIC APPLIANCE CO.

(*Armory, Left Side*)

The Edison Electric Appliance Co., makers of the famous Hot Point products, have filled large Government contracts for aviators' electrically heated clothing. An interesting part of their exhibit is an aviator's high altitude flying uniform with helmet, electrically heated gloves and pads. Such equipment is necessary for all high altitude flying, where low temperatures are encountered at all seasons of the year.

EDSTROM MACHINE CO.

(*Armory, Left Front*)

The Edstrom Machine Co. are displaying one of their wire-wrapping machines, which have been officially inspected by the Navy Department and the Department of Military Aeronautics. By means of this machine, operated by a crew of two men, a neat and strong wrap can be made in 45 seconds, which is of better workmanship than can be produced by the most skilled hand labor. In official tests the machine wrap stood 100 per cent. of the tensile strength of the wire on which it was made, amounting to more than 4,200 pounds. A test of this wrap, without soldering, resulted in nine out of ten wraps withstanding the full tensile strength of the wire, the tenth giving way at 71 per cent.

One aircraft manufacturer stated that this machine enabled two men to turn out as many wraps of a much better quality as could be obtained by manual wrapping of twelve to twenty men.

EMPIRE ART METAL CO.

(*Armory, Space* 603-606)

This company has developed a wing structure made entirely of metal, having the same weight as wood, with considerably increased strength A factor of safety of nine is obtained. These wings have been used on Curtiss JN4B training planes with great success and a pair of these wings as manufactured on Government contract, together with rudders, and wings for use on C-1 planes with a carrying load of 39 pounds per square foot are on exhibition. In addition to increased strength the use of metal adapts itself to quantity production and assembly by only moderately skilled personnel.

ERICSSON MFG. CO.

(*Garden, Space* 301-302)

The Ericsson Mfg. Co., of Buffalo, N. Y., makers of the famous "Berling" magnetos, are showing their complete line of magnetos, including the D-83 for Curtiss OX-2 motors, the D-81 for Curtiss OX-5 motors and the J-12 type, which is being developed for the new Curtiss 12-cylinder motor, now still in the experimental stage.

GENERAL ORDNANCE CO.

(*Garden, Space* 509)

The General Ordnance Company are exhibiting their non-recoil heavy aircraft gun, which has had extensive use during the war. The gun overcomes recoil by firing two opposed charges simultaneously, with the result that the recoil of each charge, being equal and opposite, is counterbalanced.

B. F. GOODRICH CO.

(*Armory, Southwest Section*)

The principal exhibit by the Goodrich Company consists of one of the first dirigibles put into the United States Naval Service. This is a "Blimp" that was completed in August, 1917, and used for seventeen months in coast patrol work in the vicinity of New York City. The dirigible is 167 feet long, 33 feet in maximum diameter and contains 80,000 cubic feet of gas. This dirigible held the record for continuous flight.

A Curtiss OX motor is used. The car is arranged to carry a crew of three men. In cruising a speed of from 40 to 50 M.P.H. is maintained.

Other exhibits by the Goodrich Company are a model spherical balloon; relief throttle valves perfected by the Goodrich Company and principally the Gammeter valve; shock absorber cords; special parachute attachments; fabrics and cloths for aeronautical use, etc. Another feature of the exhibit will be a short motion picture showing how the balloons are manufactured.

THE GOODYEAR TIRE AND RUBBER COMPANY

(*Garden,. Main Floor, Northwest*)

The Goodyear Tire and Rubber Co., of Akron, Ohio, is the most extensive aerostatic exhibit of the show. The outstanding feature of the booth is the dirigible pusher car, completely equipped, of a type which has many sisters in service. A 35,000 cubic foot type "R" military kite balloon is suspended and equipped complete. Attractive models of the twin engine Navy dirigible and a trans-continental passenger dirigible car are on display. These models are complete in every detail, including full set of instruments and controls, lockers and upholstery.

A balloon fabric complete testing laboratory was on exhibition.

Several well-arranged panels of small parts, including rope, cable, cable clamps, thimbles, junctions, manometers and bridal rings gave visitors an idea of the numerous high-grade parts that go into the construction of aerostatic craft. A panel of ropes, with various knots and ties, used by aerial "seamen," show that the art of the sailor of the sea applies to the sailor of the air as well.

A full-sized dirigible car equipped with dual control, indicating devices, including manometers, tachometers, air speed indicators, incidence and bank indicator, clock, driven by an 8-cylinder OX-2 Curtiss motor, of the type used on the FC training dirigible, having a cubic capacity of 85,000 feet, form an interesting part of the Goodyear exhibit. Models of "R" type kite balloon, military free halolons and of the U dirigible are also on display.

The Goodyear Company is represented by Mr. E. R. Preston, manager of the Government sales department, assisted by Mr. W. P. Seiberling, G M. Kurtz, R. H. Upson and H. T. Kraft, whose names are familiar to all interested in aerostatics.

HARTZELL WALNUT PROPELLER COMPANY

(*Garden, Space* 414-415)

The Hartzell Walnut Propeller Co., manufacturers of "Liberty" propellers, are exhibiting the various types of propellers which they have manufactured. This company's design has been adopted for the Loening plane, and air screws of their manufacture have been purchased in quantity by the Army and Navy for various types of planes, including the 4-bladed propeller used on the HS-1 and H-16 Navy planes.

HENDERSON FORGE AND MACHINE COMPANY

(*Garden, South Balcony*)

The Henderson Forge and Machine Co., of Detroit, are showing the complete line of crankshafts. This company manufactured a large number of Liberty motor crankshafts, and in their exhibit showed them through all the stages of manufacture from the rough casting to the final finished product.

HESS-BRIGHT MFG. CO.

(*Garden, Space* 505)

The Hess-Bright Mfg. Co. are exhibiting their line of high-grade ball bearings on neatly arranged panels. Their product is well known for quality of workmanship and materials, and has been extensively used for aircraft motors.

HART AND HUTCHINSON

(*Garden, Space* 328-329)

This manufacturer is exhibiting lockers for employees, steel stationary cabinets and tool cabinets which are sold extensively to manufacturing concerns.

JAMESTOWN PROPELLER CO.

(*Garden, Space* 112-114)

All sizes of "Falcon" propellers, the product of the Jamestown Propeller Co., of Jamestown, N. Y., of two and four bladed type, with and without metal tips, are on view at the exhibit. This company made a large contribution to the propeller production for the aircraft program during the war.

ARTHUR JOHNSON MFG. CO.

(*Armory, Left Side*)

The Arthur Johnson Company, of New York City, have made a specialty of artistic aeronautic jewelry, and in their display included propeller tie pins, watch fobs, military aviator's wings, brooches and rings. This company is making the official souvenir of the show.

JONES-MOTROLA, INC.

(*Garden, Space* 215-216)

The Jones-Motrola Company, of New York City, are displaying their complete line of air speed indicators, tachometers, altitude indicators, clocks, oil, air pressure and motor thermometers, which were manufactured on Government contract.

LAWRANCE AERO ENGINE CORP.

(*Armory, Space* 626-627)

The Lawrance Model L-1, three-cylinder, Y-type, air-cooled engine, described in detail in the March 3 issue of Aerial Age Weekly, is attracting favorable attention at the Armory. The motor is rated at 60 horsepower at 1900 revolutions per minute, and has a bore of 4¼ inches and a stroke of 5¼ inches. Its weight is 130 pounds.

LIBERTY STARTERS CORPORATION

(*Garden, Space* 514-515)

The Liberty Starters Corporation of New York City, are exhibiting their electric starter, which has been supplied to the Navy. This starter is electrically operated by a motor built by this company. Its weight is only 29 pounds, yet it delivers 1500 foot pounds and turns over a Liberty motor from 60 to 70 revolutions per minute. The Liberty starter is so designed that a hand crank can be used on the motor if necessary, this being geared to the crankshaft at a ratio of 22 to 1, while the electric motor is geared to a ratio of 240 to 1. For military purposes, a synchronizer for a machine gun was incorporated in the design, but this can be replaced if desired by a generator for supplying power for ignition, lighting or radio.

LUNKENHEIMER CO.

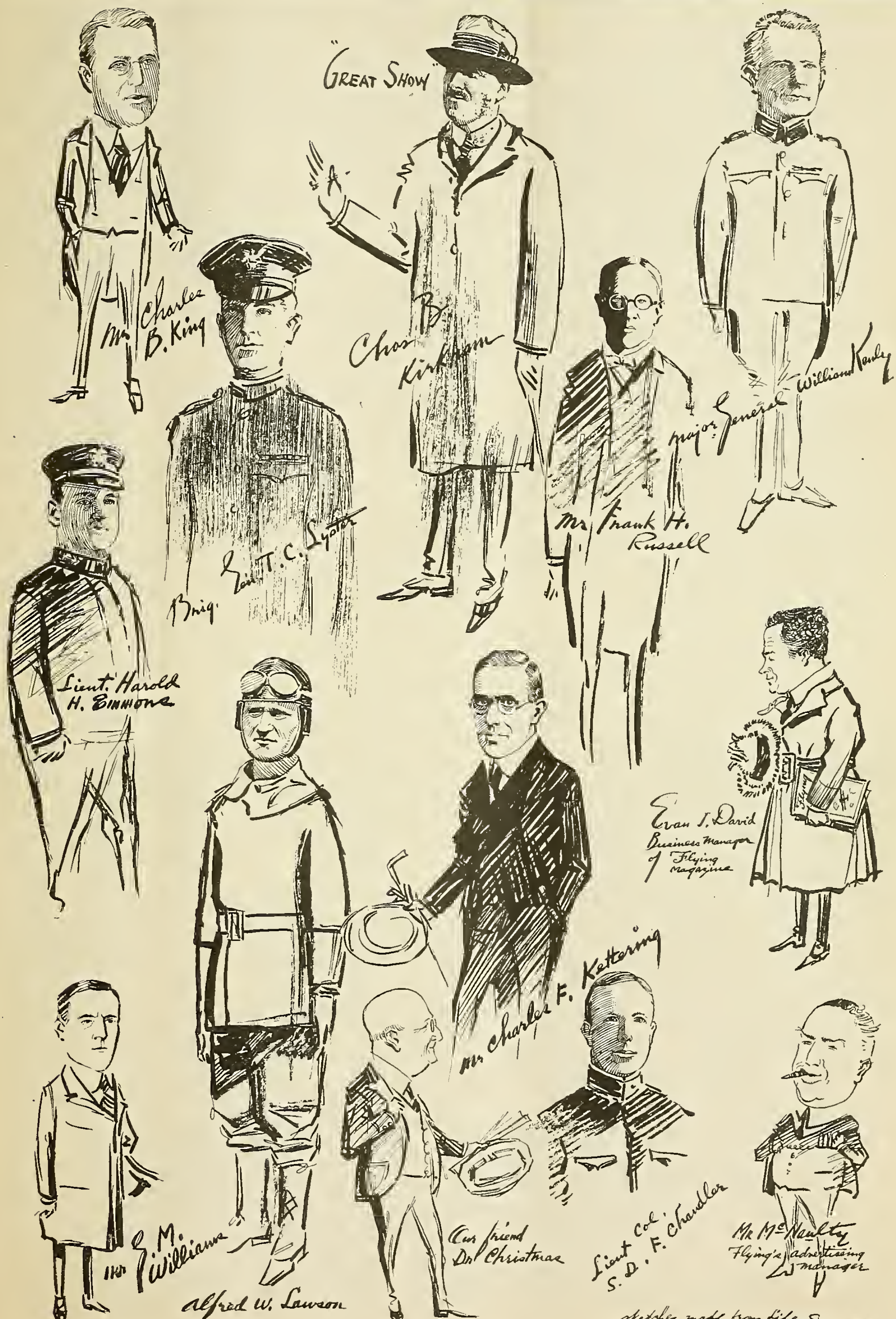
(*Garden,. Space* 516)

The Lunkenheimer Company, which has offices in New York, is exhibiting a panel of parts produced in quantity for the aircraft program, consisting of air and oil pressure gauges, pet cocks, gasoline line junctions and piping and other small auxiliary parts.

MACCOMBER WHYTE CO.

(*Garden, Space* 307-308)

The Maccomber Whyte Company, manufacturers of wire rope, has been making streamline wire on government order. This company sent their engineers to England to become familiar with the best practice there and brought back machinery for making cold rolled streamline wire. Their exhibit consists of samples of this product.



sketches made from Life at AERO SHOW by Norman E. Jennett 1919

MARLIN-ROCKWELL CORP.

(*Armory, Space* 618-623)

The Marlin-Rockwell Corporation, manufacturers of the Marlin aircraft gun, is displaying several models of their ordnance, which is familiar to Army aviators. The work of this company has won the encomium of high Government officials and their product has given excellent account of itself against enemy aircraft.

MATTHEWS BROTHERS MANUFACTURING CO.

(*Garden, Space* 510)

The Matthews Brothers Company, of Milwaukee, Wis., manufacturers of "Hamilton" propellers, are presenting an interesting and instructive exhibit of their line of propellers and seaplane hulls. The entire process of propeller manufacture, from the rough plank to the highly finished product, are displaying successively for the benefit of visitors. Finished propellers are shown cut longitudinally and latitudinally, so that the direction and thickness of the laminations and the varying thicknesses from the hub to the end of the propeller could be observed.

A feature of the Matthews exhibit is the hull of the type used on the N-9 Navy elementary training seaplane.

A. J. MEYER

(*Garden, Section* 226-227)

A. J. Meyer has been making turnbuckles for the aircraft industry for several years, and his familiar products are displayed on suitable racks for the benefit of visitors. This company engaged in intensive production during the war in order to fill the contracts which were awarded to them on time.

FRANK J. MOSSBERG

(*Garden, Space* 335-336)

The complete line of Frank J. Mossberg's wrenches and tools are being displayed in their booth at the Garden. These tools are extensively used by the automobile and aircraft industry in the assembly and repair of motors. They need no introduction to the industry, their products having found their way into every motor manufacturing plant.

MOTOR COMPRESSOR CO.

(*Garden, Space* 503)

The Motor Compressor Company, of Newark, N. J., are showing their pneumatic aeroplane motor starter, used by both the Army and Navy, and which is now being supplied to the Post Office Department for mail planes. The starter motor is a four-cylinder double opposed type and is sufficiently powerful to turn over any motor up to 550 horsepower. The pressure tank stores enough air for ten to fifteen starts. This company also manufactures pumping outfits for garages, which are being used at several aeroplane fields to supply pressure for aircraft tires.

NATIONAL ADVISORY COMMITTEE ON AERONAUTICS

(*Garden, Space* 508)

The National Advisory Committee has done extensive testing work of various aircraft accessories and parts, including spark plugs and instruments of all kinds, utilizing the facilities of laboratories throughout the country, including that of the Bureau of Standards of Leland Stanford University. An aerodynamic laboratory has just recently been completed for the use of the Committee at Langley Field. A series of tests on the aerodynamic qualities of hundreds of aerofoils and propellers resulted in the gathering of highly valuable data for the use of designers of aircraft. The exhibit of the Committee includes a great many instruments tested by them as well as charts and graphs explaining its work.

NATIONAL CASH REGISTER CO.

(*Garden, Space* 403-410)

The National Cash Register Company are exhibiting the various types of indicating instruments and wing parts which they made for the Government. This company received a contract for the manufacture of 10,000 tachometers of the famous French "Tel" type shortly after the launching of the American air program. The difficulties in securing quantity production on such a delicate instrument may be realized by the fact that 2,104 tools were made, requiring 55,325 hours of work, were needed to produce the 1,540,000 small parts to build the 10,000 tachometers.

The National Company produced 3,199,000 small screw machine parts for Liberty motors. They made all the metal fittings for the Standard J-1 training plane and made rudders, ailerons and stabilizers for DeHaviland-4 planes.

In order to secure quantity production on the air speed indicators and tachometers, the engineers of this company evolved a new method of dip brazing to avoid the necessity of using torch dipping.

THE NORMA COMPANY OF AMERICA

(*Garden, Space* 209-210)

The Norma Company of America is displaying a complete line of "Norma" High-Precision Ball Bearings, as used in ignition apparatus, lighting generators, radio-electric apparatus, gyroscopic apparatus, and other high-speed equipment used in connection with the aviation industry.

PACKARD MOTOR CAR CO.

(*Garden, Main Floor, North*)

In designing this line of engines it has been the aim of the Packard Engineering Department to retain all the good features of the Packard and Liberty aircraft engines, and at the same time eliminate features having to do with installation difficulties. The result has been an appreciable saving in weight and an increased reliability in performance.

The Model 1-A-744 Engine. This model has 8 cylinders with a 4¾" bore and 5¼" stroke, set at a 60° angle. Complete with propeller hub, carburetor ignition distributor heads, switch, generator, starting motor and switch, the engine weighs 520 lbs. Starting battery, 40 lbs. additional. Engine water, 25 lbs.; radiator water, 27 lbs.; radiator, 73 lbs. Horsepower, 160 M.P.H, at 1525 R.P.M.

The Model 1-A-1116 is similar to the 8-cylinder type, but is provided with 12 cylinders instead. Weight, 710 lbs. Horsepower, 240 at 1525 R.P.M.

The design of the Model 1-A-2025 engine is similar to the 1-A-1116, but the dimensions are changed as required for 5¾" bore by 6½" stroke. Weight, complete, 1,000 lbs. In spite of the fact that this is one of the largest aircraft engines designed to date, its compact arrangement makes neat streamline installation possible. Horsepower, 440 at 1550 R.P.M.

PERRY-AUSTEN MFG. CO.

(*Armory, Space* 616-617)

The Perry-Austen Mfg. Co. are displaying their dope products, which have been extensively used as wing covering on all types of American aircraft. Of the thousands of gallons of Aus-Per-Ite nitrate and acetate dope which they have supplied to the Army and Navy, not one gallon has been found defective or below standard by Government inspectors.

This company has brought out a new product, a combination of dope and gray varnish which reduces the time required to produce the finished wing. As the varnish is mixed with the dope, cracking and peeling, due to unequal coefficient of expansion of dope and paint, is eliminated.

RADIUM DIAL CO.

(*Garden, Space* 309-310)

The Radium Dial Co. demonstrates the efficiency of their luminous paint by means of a dark room containing several instruments treated with their product. A complete instrument panel of a DH-4 plane, formed a part of their exhibit. A bomb sight, known as Mark I-A, developed by the Government to enable the aviator to drop bombs with the accuracy which marks the direction of artillery fire, and manufactured by the Edison Company, treated with luminous paint, was one of the devices that is attracting considerable attention among the visitors at the show.

JOHN A. ROEBLING CO.

(*Garden, Space* 311-313)

The John A. Roebling Co., of Trenton, N. J., is exhibiting a complete line of aircraft wire, stranded cord, thimbles and ferrules, as well as all types and kinds of wire products and insulated wire as it applies to the aircraft industry. The exhibit is arranged in a series of glass-covered cases, each of which contains complete data relative to the products contained in it.

A novel feature of the exhibit is a coil of wire possessing the highest tensile strength for any wire of its size and weight known in the world. It is ¼ inch in diameter, 6x19 strand steel balloon cable, having a copper conductor in the center for telephonic communication. This wire is furnished to the United States Government for balloon mooring.

SCHNEIDER BROTHERS INSTRUMENT COMPANY

(*Garden, Space* 213-214)

Schneider Brothers Instrument Company, who for the past forty years have been engaged in the manufacture of weather indicating instruments, is displaying their complete line of meteorological instruments both of portable and stationary type, which were used by the Army and Navy in forecasting and recording weather conditions for the use of the air services. Many of these devices were designed by the engineers of the company, whose long experience in design and construction of instruments for the Weather Department was of great assistance in the development of instruments of this type.

This company is exhibiting the famous "Schneider" altimeter, as supplied to the Navy, anemometers for indicating wind velocity, barometers, including the large type used to standardize the meters mounted on planes, and the metereograph, which indicates and records wind velocity, pressure, temperature and humidity.

SIMMS MAGNETO CO.

(*Garden, Space* 344-345)

The Simms Magneto Co., of East Orange, N. J., is showing a complete line of aeroplane and automobile magnetos. Several types of Simms' magnetos have been used for aircraft motors, the L-16 model being suitable for King-Bugatti motors, the L-8 for Hispano-Suiza motors and the CK-8 for the Packard Aviation Motor. This last-named model was used by Ralph de Palma in his record-breaking Packard car, which used the Packard Aviation Motor.

All Simms aviation magnetos are waterproof and the permanent magnets carefully tempered to give the utmost strength of magnetic field with the highest possible retentivity.

SOCIETY OF AUTOMOTIVE ENGINEERS

(*Armory, Space* 635-636)

The standardization work of the Society of Automotive Engineers as an important contribution to war production is graphically displayed by a series of glass-covered panels showing the standards established by this society for heat-treated steels, adjustable yoke rod ends, plane yoke rod ends, eye rod ends, rods and pins, bolts and nuts and threads. These standards have been published from time to time in AERIAL AGE WEEKLY and are the guide of the aeronautic engineer.

A. G. SPALDING BROS.

(*Armory, Space* 641-642)

The A. G. Spalding Company, of New York, Chicago, San Francisco and Los Angeles, have a complete line of aviators' and yachtsmen's clothing on view at the Exposition, including several types of helmets, goggles, wool hoods, masks, leather coats and trousers, leather vests, gloves, mittens and gauntlets, mackintosh waders for naval aviators and fleece-lined boots and shoes. The Spalding Company has developed a non-sinkable coat, guaranteed to keep a man afloat on the water fully sixty hours. Their complete line fills every need.

LAWRENCE SPERRY AIRCRAFT CO.

(*Armory, Southeast*)

A new type of indicating instrument of great value to the air pilot is being exhibited by the Lawrence Sperry Aircraft Company, of Farmingdale, Long Island. This device is a turning indicator, which instantly responds to any change in lateral direction of flight, yet is unaffected by side gusts and banking, unless accompanied by turning motion. This device is demonstrated by a model plane, fitted with the new instrument, which showed instant deflections when its lateral direction was changed.

The familiar Sperry banking indicator and the Sperry compasses are again in evidence.

The W. B. B. motor is making its first appearance at the show, and it will be described in detail in a future issue. It is a light-weight four-cylinder, V type, air-cooled, 129¾-pound motor, developing 38 horsepower. Reliability, simplicity and economy of operation are its chief characteristics at 1800 revolutions per minute. An engine of this type is installed in the Dayton-Wright "Messenger" aeroplane. The Sperry Company has also arranged to have a running test of the engines at a nearby garage where ten-hour endurance runs will be made. A detailed description of this motor will appear in a future issue of AERIAL AGE WEEKLY.

Sperry is also exhibiting a special parachute and launching device, and a constant speed air fan developed for the War Department to drive radio generators.

SPLITDORF ELECTRICAL INSTRUMENT COMPANY

(*Garden, Space* 521)

The Splitdorf Electrical Instrument Company is displaying their complete line of magnetos and ignition parts, including the two magneto unit for use on Liberty motors. This company manufactures complete ignition outfits for all sizes of aircraft and automobile motors, as well as distributors and electrical measuring instruments.

STANDARD PARTS CO.

(*Armory, Space* 610-611)

The tremendous achievements of this company in the production of aeronautic parts of all kinds in their various factories through the Middle West has earned for them a place in the parts manufacturing industry second to none. The company is represented at the exposition by various members of the sales and executive forces.

STERLING ENGINE CO.

(*Garden, Exhibition Hall*)

The Sterling Engine Co., of Buffalo, N. Y., are manufacturers of marine motors ranging from 10 to 300 horsepower with from 2 to 8 cylinders. This firm is exhibiting a comprehensive line of marine motors, including various types made for the American, French and British Government for use on seaplane tenders. The Sterling Company completed a contract for Sunbeam motors for the United States Government.

STEWART HARTSHORN CO.

(*Garden, Space* 317-318)

The Stewart-Hartshorn Co., manufacturers of streamline wire, are exhibiting their products on panels, showing the nine stock siezs which they have supplied in quantity. The Hartshorn strap end, which is their exclusive product, has been submitted to most rigid tests and has shown a breaking strength in excess of 200,000 pounds per square inch for the wire for which it is designed. The wire itself has a breaking strength of 165,000 to 175,000 pounds, which shows that the strap end will hold even if the wire is strained to the breaking point. DH-4 planes manufactured by the Standard, Dayton-Wright and Fisher Body Corporation and the SE-5 seaplane manufactured by the Curtiss Company were exclusively equipped with Hartshorn streamline wire. This company also completed a contract for Liberty motor valve springs.

STONE PROPELLER CO.

(*Garden, Space* 138-139)

The Stone Propeller Co., of Dayton, Ohio, one of the pioneers of the propeller industry, are manufacturing the propeller used on La Pere fighters and have completed a large contract for propellers for use on the DH-4 plane and for planes using Hispano-Suiza, Rolls-Royce, Curtiss, Hall-Scott, Gnome and LeRhone motors. This company is displaying their complete line of propellers for the industry, ranging from a small 6 foot 6 inch size for use on Ford motored aeroplanes to some of the largest sizes in use.

STROMBERG MOTOR DEVICES CO.

(*Garden, Space* 504)

The Stromberg Motor Devices Company exhibit includes a series of models of carburetors suitable for aviation engines of all sizes and powers. The NAV-6 model is used on the 300-horsepower Hispano-Suiza motor; the NAD-6 on the 180-horsepower Hispano-Suiza, and the NAD-6 on the Thomas Morse 8-cylinder. This carburetor was used on the Loening plane in establishing the 3-passenger speed record and on the plane which recently established the American altitude record of 29,500 feet.

TIPS AERO ENGINE CO.

(*Garden, Space* 125-126)

The Tips Aero Engine Company is exhibiting for the first time their 18-cylinder, 480-horsepower rotary motor, which has a weight of only 850 pounds. This motor is of radical design of the utmost simplicity, using rotary valves, permitting of exceptional cooling and lubrication. This motor has just been completed by the engineers of this company and possesses many original and interesting features of design.

TITEFLEX METAL HOSE CORPORATION

(*Armory, Space* 624-625)

This company has brought out a special unpacked, absolutely tight all metal tubing that possesses inherent flexibility instead of depending on the movement and slipping of a joint to obtain bending. This material overcomes the limitations of the flexible metal tubing that has heretofore been available, in that absolute tightness is obtained, yet possesses a greater degree of flexibility without the lessening of the degree of either at the expense of the other. It has been impossible heretofore to obtain a material that would successfully handle very high pressures, and one that would give a satisfactory degree of durability, and although this new tubing is slightly more in first cost, it proves itself to be most economical by giving longer life in service.

The manufacturer's whole facilities were given over to the Government during the war to supply this product to the various departments, and in a number of instances it was found to be the only tubing that could satisfactorily meet the drastic requrements in the special installations that were made.

The Bureau of Aircraft Production used an assembly of this tubing with fittings as an all-metal gasoline feed line from the fuel supply tank to the carburetor on various planes, and the Bureau of Steam Engineering of the U. S. Navy equipped several types of seaplanes and dirigibles with this tubing for conveying gasoline, oil and air. It is a noteworthy fact that the Caproni in the service of the Italian Government were considering the use of this material in connection with their plane work at the time of the closing of the war.

Additional uses by the United States Government were as gasoline, oil, water and air lines on standardized trucks, caterpillar type of tractors, battle tanks, heavy mobile gun mounts, etc. The tubing lends itself to many interesting uses, an instance being that of the Eastman Kodak Co., which is employing it as a protecting housing around a revolving shaft on aeroplane cameras.

This company is identified with Westinghouse interests, Mr. H. H. Westinghouse being chairman of the Board of Directors, and its official personnel is composed of Mr. C. W. Fletcher, president and general manager; H. R. Smith, secretary and treasurer; W. H. Fulton, chief engineer, and C. E. Mackay, director of sales. The general office and works of the company are at Badger Avenue and Runyon Street, Newark, N. J., where the plant facilities of the organization are modern and of large capacity and with space in reserve for expansion.

TORRINGTON COMPANY

(*Garden, Space* 104-107)

The Standard Plant of the Torrington Co., of Torrington, Conn., was devoted to the manufacture of streamline wires, tie rods, clamps, lock nuts, washers, spokes and nipples for aeroplane wheels for the aircraft program. A complete exhibit of all sizes and types of such parts mounted on display racks forms the principal part of this company's exhibit.

The Langley, the first American-built Handley Page, is equipped with Torrington streamline wire. A full set of DH-4 wires and fittings, as manufactured by this company, was mounted on racks and forms an interesting part of the exhibit.

TRIPLEX SAFETY GLASS CORPORATION

(*Armory, Space* 637-638)

Safety goggles of all kinds for aviators are in evidence at the Triplex booth. These goggles have earned an excellent reputation among military aviators, for they have contributed substantially to the safety of flying. Although a blow can shatter them, the glass does not splinter, thus eliminating all danger to the aviator's eyes.

U. S. BALL BEARING CO.

(*Garden, Space* 120-122)

This company is displaying its complete line of ball-bearing products, large quantities of which have entered into the construction of motors for the military aircraft program.

VALENTINE & CO.

(*Garden, North Balcony*)

This company is exhibiting their full line of waterproof varnishes, which are extensively used on seaplanes and propellers. A feature of their exhibit is a propeller which was kept in motion in a glass tank of water, without there being any visible deleterious effect on the propeller varnish.

VAN SICKLEN CO.

(*Garden, Space* 502)

The Van Sicklen Company, manufacturers of tachometers and oxygen equipment, has an interesting exhibit of their various products. The Prouty oxygen system, developed by this firm for supplying the aviator with the necessary oxygen at high altitudes, is considered superior to the devices used by foreign governments. Not only is the oxygen supply regulated according to the altitude of the plane, but compensation is made for decreased tank pressure due to dropping of temperature. The supply tank holds 800 litres of oxygen at a pressure of 150 pounds. The instrument is equipped with an accurate pressure indicator, and a simple regulator for increasing the supply from one to two men, as needed.

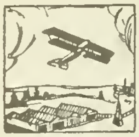
The altimeter designed and built by this company has a specially designed diaphragm which eliminates the use of the chain drive for the indicating needle, this obviating the chief cause of inaccuracy for this type of instrument. Furthermore, the diaphragm expands uniformly according to the altitude, thus making an even scale possible without compensating gears.

WELLINGTON, SEARS AND CO.

(*Armory, Space* 628-630)

The Wellington, Sears & Co., of Centerville, R. I., which manufactured every type of aero-

Some of the attendants of the Curtiss Aeroplane & Motor Corporation exhibit, who prove real attractions



THE NEWS OF THE WEEK

Aeroplane for Oversea Flight Now Being Rushed at Navy's Factory

According to press dispatches, a type of naval aeroplane, which in point of size, power and carrying capacity greatly exceeds the N C-1, is now under construction at the Navy's League Island aircraft factory in Philadelphia, it became known recently when an aircraft designer, who has been at the factory, described its features in detail.

The designer, who would not consent to have his name made public, said that work on the plane was going on night and day in order to have it ready as soon as possible for the contemplated trans-Atlantic flight. Officials of the Navy's Air Service, he said, had great faith in the new flying boat, and believed it would accomplish a trip to Europe with little or no difficulty.

. The design of the new super-aeroplane, which is known as Model T, is similar to the Navy's F-5, now being shown at the Aeronautical Exposition. It has an upper wing span of 250 feet, which is 124 feet more than the N C-1. The lower wing is 25 feet less. The length of the craft over all is 80 feet. The wings are 12 feet broad and 14 feet apart.

The motive power for the new naval aeroplane will be supplied by five Liberty motors of 400 horsepower each. Three will be tractors and two pushers.

Seventy-five passengers will be able to ride comfortably in the Model T, according to press dispatches, making ample allowance for tanks carrying sufficient gasoline and oil for a flight of 2,000 miles. The N C-1 has carried fifty-one passengers on one of its trips. If the new Model T lives up to the hopes of its builders, it will establish a new passenger-carrying record.

Construction on the machine has progressed so rapidly that its completion is expected in the very near future, according to the aircraft designer who told of its details. He was unable to express himself more definitely as to the date of its completion, he said, because of the many unforeseen difficulties which arise in building aeroplanes of a new type.

Lieutenant Flachaire Returns to United States

New York, N. Y.—Lieutenant Georges Flachaire, who spent several months in the United States last year and has many friends and admirers in this country, arrived in New York recently on the S. S. *Touraine*. Lieutenant Flachaire has been decorated with nearly every military medal that can be conferred on a French flying officer.

Congress Aids Ground Training in Colleges

Washington, D. C.—The joint resolution which the Senate recently passed was modified to insure that the loaning of air service equipment to colleges be confined to ground training. It authorizes the Secretary of War to loan aircraft engines and equipment to encourage the development of the science of flying, for the loans are to be made to "such educational institutions as provide advanced mechanical and technical instructions." The first application for the loan of such equipment has been made by the College of the City of New York.

Radio Telephones at Aero Show

New York, N. Y.—The Division of Military Aeronautics has authorized Lieutenant J. E. Adams, of Hazelhurst Field, Mineola, L. I., to conduct formation flights over Madison Square Garden during the Aeronautical Exposition. The flights are made daily between noon and two o'clock and directed by radio telephones at the Exposition. Telephone receivers for visitors are available, making it possible to hear the orders transmitted, in the same way as the aviator in the plane above hears them.

S. A. E. Aeronautic Meeting

New York, N. Y.—The Society of Automotive Engineers, held on March 7, during the Aeronautic Exposition, a meeting at which many important engineering questions involved in the commercial use of aircraft will be presented and discussed.

An afternoon session began at four o'clock at the headquarters of the S. A. E., 29 West 39th Street, this being followed by a supper there, at which an informal conference of the automotive engineers and their guests afforded an opportunity to take up in an intimate way just what is possible, new or in sight in the commercial as well as sporting use of aircraft.

At the afternoon session C. H. Day had as his subject "The Commercial Future of Aeroplanes from the Engineer's Standpoint." Archibald Black, of the United States Navy, summarized a comprehensive paper he had prepared for the S. A. E. on Aircraft Radiators.

At the evening session representatives of the Army and of the Navy, as well as of the industry, who are engineering authorities on aeroanutics, addressed the members.

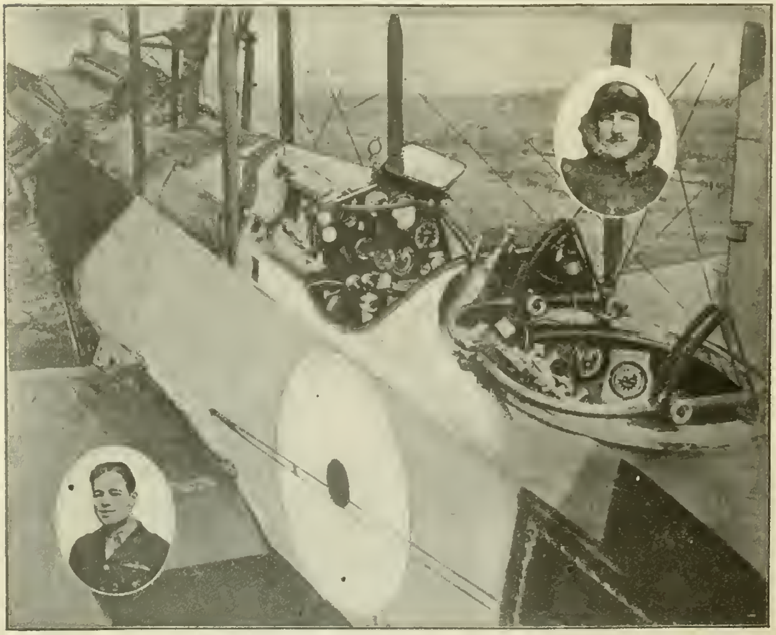
March 7 was designated officially as S. A. E. day by the management of the Aeronautical Exposition.

Civilian Flying Licenses to be Required

In the February 24 issue of AERIAL AGE we printed the Aero Club of America's recommendations to provide for the registration of aircraft and aviators by the Department of Commerce.

It is announced that President Wilson, in submitting to the House the recommendations of the National Advisory Committee for Aeronautics for legislation placing the licensing and regulation of aerial navigation in charge of the Department of Commerce, declared that he "fully approved the suggested legislation." Secretaries Baker, Daniels and Redfield also indorsed the proposal.

The legislation would give the Department of Commerce authority to issue licenses for civilian operation of aircraft and provides an appropriation of $25,000 for the necessary expenses. A letter from C. D. Walcott, Chairman of the Executive Committee, said the legisaltion should be passed at the present session. Mr. Walcott, pointing out the absence of any Federal authority for establishing rules and regulations governing civilian operation, said if the War Department sold its surplus machines many amateurs would attempt flying, which would result in many accidents. Operation of "unlicensed and irresponsible aircraft," he added, would cause probably complications through smuggling from Mexico and Canada.



The Pilot's and the Observer's cockpits on the D. H. 9 machine with which, on January 2, an altitude record of 30,500 ft. was made at Martlesham by Capt. Lang, R. A. F., as pilot, and Lieut. Blowes as observer, both of whom are inset. The machine was equipped with a Napier "Lion" engine. The two oxygen tubes, which supplied the oxygen, are shown back of the windshield of the rear seat

Discharge Emblem Selected

Washington, D. C.—The War Department authorizes the following statement:

The "honorable discharge" emblem to be issued by the War Department will be a bronze lapel button somewhat similar to the G. A. R. button of like significance. It is the intention of the Government to distribute the button free of charge to all entitled to it. The buttons will be manufactured only by concerns chosen by the Government, which will furnish the dies for their manufacture and purchase the buttons, thus obviating any possible variance from the approved pattern in design, color or material.

Of appropriate and artistic design, the button is the result of a competition among American artists and sculptors, conducted by the Commission of Fine Arts of which Charles Moore is chairman, and the following are members: Herbert Adams, J. Alden Weir, Charles A. Platt, William Mitchell Kendall, John Russell Pope, James L. Greeneaf and Col. C. S. Ridley, secretary. Fifteen designs were submitted by the commission for final selection by the Chief of Staff.

Secretary Daniels Commends Naval Airmen

Secretary Daniels has commended the men of the office of the Inspector of Engineering Material, Brooklyn Aeronautic District; also the men of the Navy Aviation Mechanics School for carpenter's mates, Keyport, N. J., for the splendid manner in which they conducted themselves while on guard duty during the fire at Morgan, N. J., on the night of October 4, 1918.

Distribution of Aircraft Personnel in U. S. and Overseas

The Statistics Branch, General Staff, War Department, issues the following table, showing the distribution of the military aeronautics personnel in the United States and overseas at various dates:

			Per cent.	
	In United States	Over-seas	In United States	Over-seas
Nov. 11	79,321	78,786	50	50
Nov. 18	80,689	78,973	51	49
Nov. 25	84,785	78,361	52	48
Dec. 2	84,844	78,061	52	48
Dec. 9	89,661	70,040	56	44
Dec. 21	81,607	61,345	57	43
Dec. 26	77,140	59,917	56	44
Jan. 6	67,833	59,584	53	47
Jan. 16	51,821	58,854	47	53
Jan. 23	46,467	58,133	44	56
Jan. 30	41,314	57,527	42	58
Feb. 6	37,537	56,299	40	60

Army Aviators Fly Over Grand Canyon 1,400 Feet Up

Kingman, Arizona.—What was said here to-day to have been the first aeroplane flight over the Grand Canyon of the Colorado was made by Lieuts. R. O. Searles and E. D. Jones in a De Haviland bombing plane. They flew from Kingman to the canyon and return after following its course for many miles. The flight was made at an altitude of about 14,000 feet and lasted two hours.

Only Two U. S. Units Cited as a Whole

Washington, February 25.—Only two units of the United States Army, Sanitary Section No. 646 and the 103 Aero Squadron, have been authorized to wear the French shoulder cord, known as the fourragere, indicating that the unit as a whole has been cited for gallantry in action. This was disclosed in a circular made public by the War Department relative to uniform and decorations.

Will Advise Brazilian Navy

Washington.—Assignment of Lieutenant-Commander Wadleigh Capehart, of the office of naval operations, to duty as adviser to the Brazilian Government on naval aviation matters, was announced in navy orders.

Authorization for Travel Expenses Made by War Department

Washington, D. C.—A paragraph of General Order 22 makes possible reimbursement of officers, men and civilian employees for travel expenses incurred in line of duty:

3. Section IV, General Orders, No. 27, War Department, 1918, as amended by Section III, General Orders, No. 81, War Department, 1918, is rescinded and the following substituted therefor:

"Actual and necessary expenses, not exceeding $5 per day, may be paid from the Signal Corps appropriation of July 24, 1917, or from the Air Service appropriation of July 9, 1918, to officers, enlisted men, and civilian employees of the Army, and authorized agents when sent on special duty for aviation purposes at home or abroad under specific instructions from the Secretary of War."

Vouchers submitted for payment under the provisions of this order will be accompanied by an itemized statement of expenses.

College of City of New York Starts More Aeroplane Courses

New York, N. Y.—The College of the City of New York is still enrolling students for its four courses on aeronautics, outlined below. The equipment of the school is valued at $85,000, and is on exhibition during the period of the Aeronautical Exposition at Madison Square Garden at Compton Hall every evening, except Sundays.

The instruction is designed to prepare men for the flying school, mechanical jobs with aircraft and motor companies, for positions as draftsmen, designers and aeronautical engineers. They are preparatory courses for the regular courses that will be established for a degree.

The schedule is as follows:

Aeroplane Mechanics: Lectures and laboratory work on general principles of construction and operation of an aeroplane. Course—eight weeks—two nights per week. Starts March 14. Fee $10. Laboratory, Wednesday, 7:30 to 10:15 P. M. Lecture, Friday, 7:30 to 10:15 P. M.

Advanced Aeroplane Mechanics: Lectures and laboratory work on general principles of construction and operation of aeronautical motors, both American and foreign design. Course—eight weeks—two nights per week. Starts March 14. Fee $10. Lecture, Wednesday 7:30 to 10:15 P. M. Laboratory, Friday 7:30 to 10:15 P. M.

Aeroplane Drafting: Practical work in detail and assembly drawings of airplanes and parts. Emphasis will be given to the development of practical production drawings following the systems used in all modern production plants. Course—eight weeks—two nights per week. Starts March 15. Fee $10. Drawing Room, Monday and Saturday 7:30 to 10:15 P. M.

Aeroplane Design: This course covers the theory and design of different types of airplanes. The complete engineering calculations of two machines are worked out in the classroom and in addition, each student works out the design of an original machine. There are no requisites for any of these courses but the instructors are glad to advise prospective students relative to their program. Course—eight weeks—two nights per week. Starts March 18. Fee $10. Lectures, Tuesday and Thursday 7:30 to 10:15 P. M.

Mr. E. C. McHugh, formerly in charge of an operating department of the Dayton-Wright Aeroplane Company, has accepted the position of works manager of the Stueben Truck Co., Cincinnati, Ohio.

Sir Charles Allom, one of the principal members of the British firm, Gosport Aircraft Co., has been visiting the United States for some time and has opened officers at 19 East 52nd St., New York.

Official Regulations for Transatlantic Flight

The $50,000 *Daily Mail* Prize for the first trans-Atlantic flight made within 72 consecutive hours is being offered under the following conditions formulated by the Royal Aero Club:

Qualification of Competitors.—The competition is open to persons of any nationality not of enemy origin, holding an Aviator's Certificate issued by the International Aeronautical Federation and duly entered on the Competitors' Register of the Royal Aero Club.

No aeroplane of enemy origin or manufacture may be used.

Entries.—The Entry Form, which must be accompanied by the Entrance Fee of £100, must be sent to the Secretary of the Royal Aero Club, 3, Clifford Street, London, W. 1, at least 14 days before the entrant makes his first attempt.

No part of the Entrance Fee is to be received by the *Daily Mail*. All amounts received will be applied towards payment of the expenses of the Royal Aero Club in conducting the competition. Any balance not so expended will be refunded to the competitor.

Starting Place.—Competitors must advise the Royal Aero Club of the starting place selected, and should indicate as nearly as possible the proposed landing place.

All starts must be made under the supervision of an Official or Officials appointed by the Royal Aero Club.

Identification of Aircraft.—Only one aircraft may be used for each attempt. It may be repaired en route. It will be so marked before starting that it can be identified on reaching the other side.

Stoppages.—Any intermediate stoppages may only be made on the water.

Towing—Towing is not prohibited.

Start and Finish.—The start may be made from land or water, but in the latter case the competitor must cross the coast line in flight. The time will be taken from the moment of leaving the land or crossing the coast line.

The finish may be made on land or water. The time will be taken at the moment of crossing the coast line in flight or touching land.

If the pilot has at any time to leave the aircraft and board a ship, he must resume his flight from approximately the same point at which he went on board.

General

1. A competitor, by entering, thereby agrees that he is bound by the Regulations herein contained or to be hereafter issued in connection with this competition.

2. The interpretation of these regulations or of any to be hereafter issued shall rest entirely with the Royal Aero Club.

3. The competitor shall be solely responsible to the officials for the due observance of these regulations, and shall be the person with whom the officials will deal in respect thereof, or of any other question arising out of this competition.

4. A competitor, by entering, waives any right of action against the Royal Aero Club or the proprietors of the *Daily Mail* for any damages sustained by him in consequence of any act or omission on the part of the officials of the Royal Aero Club or the Proprietors of the *Daily Mail* or their representatives or servants or any fellow competitor.

5. The aircraft shall at all times be at the risk in all respects of the competitor, who shall be deemed by entry to agree to waive all claims for injury either to himself, or his passenger, or his aircraft, or his employees or workmen, and to assume all liability for damage to third parties or their property, and to indemnify the Royal Aero Club and the proprietors of the *Daily Mail* in respect thereof.

6. The Committee of the Royal Aero Club reserves to itself the right, with the consent of the Proprietors of the Daily Mail, to add to, amend or omit any of these rules should it think fit.

1 February, 1919.

Offices: The Royal Aero Club, 3, Clifford St., London, W, 1, H. E. Perrin, secretary.

The Aero Club of America will receive the entries in the United States and will carry out the Royal Aero Club's rules and regulations.

A line-up of King-Bugatti aviation motors at the Duesenberg Motor Corporation, Elizabeth, N. J.

Conference On Disposal of Surplus Plywood and Veneer

Conferences were held February 13 and 19, 1919, in the Council of National Defense Building, Washington, D. C., and were attended by the following representatives of the Government and a committee representing the plywoods and veneers industry:

War Department

Maj. W. M. Crunden, Office of Director of Sales; Maj. D. J. Beem, Ordnance Department; Capt. J. L. Synder, Bureau of Aircraft Production; Lieut. William J. Walsh, Bureau of Aircraft Production; W. P. Gleason, Office of Director of Sales; Fred S. Morse, Surplus Property Division; Edw. D. McConnell, Bureau of Aircraft Production; Frank R. Ing, Bureau of Aircraft Production; Lieut. C. P. Cronk, Bureau of Aircraft Production; W. E. Farnan, Bureau of Aircraft Production.

War Industries Board

Richard L. Humphrey, director of building materials, Building Materials Division; M. A. Styles, Building Materials Division.

Plywoods and Veneers Industries

O. C. Lemke, Underwood Veneer Co., Wausau, Wis.; P. M. White, Algoma Panel Co., Algoma, Wis.; C. Fred Calhoun, Frosts' Veneer Seating Co., Sheboygan, Wis.; C. B. Allen, Allen Eaton Panel Co., Memphis Tenn.; F. W. Eggers, Eggers Veneer Seating Co., Two Rivers, Wis.; W. H. Rodis, Rodis Lumber & Veneer Co., Marshfield, Wis.

The chairman of the conferences, Richard L. Humphrey, stated the purpose of the meeting was to consider a method of procedure for the disposal of Government surplus stocks of plywood and veneers that would be for the best interests of the Government, and at the same time meet with the approval of the industry.

As a result of these conferences a method of procedure was unanimously agreed to by the representatives of the Government and of the industry by which these stocks will be disposed of by the Government in cooperation with the industry.

The plan of procedure agreed to covers only the surplus stocks that are not absorbed through redistribution among the several bureaus of Government use.

The representatives of the industry expressed their gratification at the outcome of the conferences and the belief that the method of procedure which had been agreed to would remove the uncertainty and menace which these stocks have exercised over the veneer and plywood market.

Christian Girl Back at His Desk

Cleveland.—Christian Girl, president of the Standard Parts Co., who has been South recuperating from a slight operation this fall, is again in good health, and will resume his busines duties in April.

Personal Pars

Lieut. Fred. M. Young, who has recently returned from overseas duty in the air service, has become associated with the Perfex Radiator Co., Racine, as sales engineer.

Dedell Heads Firestone Advertising

Akron.—J. R. Dedell, until recently connected with the Corday & Gross Advertising Co., Cleveland, has been appointed advertising manager of the Firestone Tire & Rubber Co., Akron.

The Martin Cruising Bomber

The Martin Cruising Bomber is equipped with two engines located in the fuselage and driving two tractor propellers by means of bevel gear transmission. Since either engine will drive both propellers, the failure of one of the engines does not impair the efficiency of the plane.

Either two Sunbeam 300 H.P. engines drive the plane at 74 M.P.H., or two Liberty 400 H.P. engines will drive plane at 81 M.P.H.; in either case with a two ton useful load.

Fully loaded the machine can make a speed of 110 miles an hour. The useful load is three tons not including one ton of fuel and oil.

The K-bar cellule truss is used, which eliminates half of the cellule structural resistance due to wires transverse to the line of flight.

The machine is also provided with the Martin retractable landing chassis, which has been found to be strong, light and reliable. It eliminates 14 per cent of the structural resistance of the Bomber.

Mr. Martin claims that safety and dependability are increased because of independent transmission support, for the propeller breakage will not endanger cellule truss, and because cellule strusses are low and are more accurately calculable.

As the engines are enclosed, resistance is no greater than where a single engine is used. Such placing makes the engines accessible for minor repairs and adjustments.

H. H. Newsom Back With Standard Parts

Mr. H. H. Newsom is back with the Standard Parts Co. as manager of the Standard Welding Plant. In the spring of 1918, the Director of Aircraft Production requested the services of Mr. Newsom in connection with engineering and production work on radiators, Mr. Newsom's experience as production manager and director of purchases for the Standard Parts Co., then one of the few manufacturing concerns having extensive experience in the construction of radiators for military aeroplanes, particularly fitting him for the duties of his position. The department with which he was identified ten folded the output of radiator manufacturing concerns then in production.

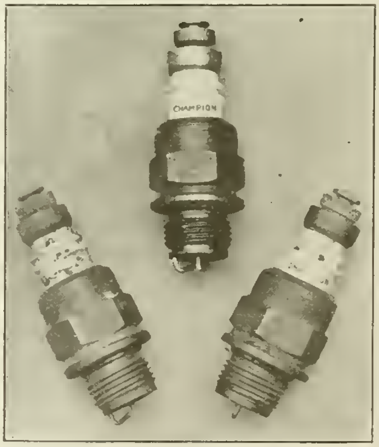
Laureati's Aeroplane at City College Exhibit

The aeroplane in which Capt. Giulio Laureati, the Italian aviator, made the historic London-Turin flight of 656 miles in six and a half hours, has been placed on exhibit in the College of the City of New York. Capt. Laureati crossed the Alps at a height of 12,000 feet.

The machine was obtained through the Italian Aeronautical Society. The addition swells the aeronautical collection of the college, and the trustees have decided to push to completion the concrete structure begun on the college grounds under Government auspices, which was to have housed the Students' Army Training Corps. The college paid the United States $3,000 for the semi-finished building.

American Bosch Stock All Sold

February 8th—Hornblower & Weeks announce that the underwriting of the notes of the American Bosch Magneto Corporation and sale of the common stock has been closed. The rapid financing of this company is an indication of the optimism and confidence which investors have in the re-organized company.



Champion Plugs Withstand Heat Test

Champion spark plugs, manufactured by the Champion Spark Plug Co., of Toledo, Ohio, were recently made the subject of a rather severe heat test, and, as shown in the accompanying cut, withstood the test remarkably well. A training plane "crashed" and the wreckage caught fire. The intense heat destroyed not only all combustible parts, but such metal parts as the crank case and bearings. After the fire died down, the spark plugs were removed, and found in good condition.

Hooven Radiator a Combination of Tubular and Honeycomb

The Hooven radiator, manufactured by the Hooven Radiator Company of Chicago, presents several novel features. It is a combination of the tubular and honeycomb types, the tubes being pressed into sheet metal running vertically, giving larger water passages and allowing a free circulation of water, thus reducing chance of clogging. By slightly building up the ends of the sheets to a width of ⅛ inch on each side with a different angle that is pressed into the water section of the core and corrugating the metal horizontally the honeycomb feature is obtained. This allows a space for a sheet of water 1/16 inch thick circulating between tubes through a staggard channel.

The relation between the cross sectional area of the water passages and its corresponding air passage cross sectional area was determined from a great number of experiments varying the water flow against the average air velocities and an empirical equation was derived.

The rigidity and durability of the radiator is greatly increased because the tubes are pressed vertically and corrugated horizontally, this making re-enforcement in both directions. The top and bottom sections of the radiator core are not merely bent over and soldered, but both lock-seamed and soldered.

Christensen Starter Survives Severe Official Tests

The Christensen starter, which has been successfully applied to Liberty, Hispano-Suiza, Duesenberg and other aircraft motors, was subjected to most severe tests before being approved for use on Government planes. The Christensen starter is a compressed air starter, which not only sets the motor in motion by means of an injection of air at high pressure into the cylinders of the motor, but insures easy and rapid starting, because the compressed air supplied to the cylinder is richly impregnated with gasoline vapor.

In a Signal Corps test of a No. 12 type starter on a cold and stiff Liberty 12 motor to determine the number of starts that could be obtained without recharge of the pressure tank, 12 starts were made in an average time of two seconds each, 19 pounds of pressure being taken from the tank for each start. The time required to recharge the tank to full pressure was 2 minutes and 45 seconds.

A test to ascertain how long the motor would run on the starter mixture with the main carbureter shut off gave the following results: Total running time, 34.2 seconds; tachometer reading, 350 R. P. M.; total number of revolutions obtained during test period, 118; motor fired evenly and regularly during test.

Captain Jean Richard of the French Commission and Captain Boer of the British Mission conducted tests to find out how many starts could be obtained from one charge of the pressure tank, with the following results: 13 starts in an average time of 1.77 seconds each were made with a cold motor having cold city water flowing through the cooling system.

At a test on a seaplane with a Liberty 12 motor at Great Lakes Naval Training Station, 20 starts were made in an average time of 1.29 seconds, some of these being made in less than 1 second.

On a Hispano-Suiza 8-cylinder motor 24 starts were obtained from a tank charged to 240 pounds pressure. When the test was completed, 150 pounds of pressure still remained, this being sufficient to obtain several more starts. On a plane in flight 1¼ seconds was sufficient to restart a dead motor.

Aluminum Co. Bonds On Sale

The Aluminum Company of America has sold $12,000,000 serial 6 per cent. gold notes to the Guaranty Trust Company of New York and the Union Trust Company and the Mellon National Bank of Pittsburgh. The notes, now on sale, will be dated March 1 and will mature in blocks of $4,000,000 each on March 1, 1921, to 1923, inclusive. Announcement was made recently that the Aluminum Company's net earnings in each of the last four years, after providing for taxes and depreciation, had been more than $8,000,000.

Hon. Alhert S. Burleson, Postmaster General
Hon. Otto Praeger, Second Assistant Postmaster General
J. B. Corridon, Superintendent, Division of Aerial Mail Service

Louis T. Bussler, Chief of Maintenance and Equipment
J. Clark Edgerton, Chief of Flying Operations
George L. Conner, Chief Clerk, Division of Aerial Mail Service

PILOTS

Ira O. Biffle
Dana C. DeHart
Edward V. Gardner
Lawton V. Smith
Leon D. Smith
Rohert F. Shank
Irving Graeh

John A. Jordan, Superintendent, Western Division
Trent C. Fry, Manager, Belmont Park, L. I.
Charles I. Stanton, Manager, College Park, Md.
John M. Miller, Manager, Bustleton, Pa.
O. J. Sproul, Manager, Chicago, Ill.
C. E. McMillan, Manager, Cleveland, Ohio
August Carlson, Manager, Lehighton, Pa.
Harry F. Powers, Manager, Bellefonte, Pa.
William Lindley, Manager, Clarion, Pa.
J. P. Edwards, Manager, Bryan, Ohio
Charles N. Kight, Special Representative

RESERVE PILOTS

Lester F. Bishop
Dan Davison
C. C. Eversole
E. A. Johnson
D. I. Lamh
Frank McCusker
E. H. Lee
Lyman Doty

CHIEF MECHANICS

Frank Tower
Edward C. Radel
Chas. C. King
H. E. Fremming
Alhert Cryder

An Aero Mail Questionnaire

Otto Praeger, Second Assistant Postmaster General in charge of Aero Mail, has sent out a questionnaire to the pilots in the service with a view to getting consensus of opinion on the desirable type of aeroplane for the mail service. So that this discussion may be of the utmost value to the Post Office Department AERIAL AGE is presenting herewith the questionnaire with the request to our readers that they send their suggestions to Otto Praeger, Second Assistant Postmaster General, Washington, D. C.

QUESTIONNAIRE

Requirements for Ideal Mail Ship

It is requested that you fill out the following question forms, the purpose of which is to aid the Post Office Department in the development of a commercial type ship, suitable for schedule flying. You are asked to place your answers on another sheet with the proper number and letter designations.

1. *General Specifications.*
   a. How many motors?
   b. Mailing load in pounds at 17½ pounds per cubic foot?
   c. Should a pilot-mechanic be carried?
   d. Do you think wings should hinge on large ships for storage purposes, and how?
   e. At what altitude should ship be balanced?
2. *Performance* (normal load)
   a. What should cruising speed be, and at what altitude measured?
   b. Minimum buoyancy speed?
   c. Cruising radius?
   d. Have you an idea for slow landing device, either inherent or mechanical; if so, what?
   e. What should climb of 6,000 ft. be, and what service ceiling?
   f. What percentage of normal maximum power should keep a ship at an even altitude?

Ship by Units

1. *Motors*
   a. Where should motor or motors be located.
   b. Should each be independent?
   c. Should they be accessible during flight, and how?
   d. Do you recommend motor starters? What type?
   e. Should radiators have complete shutters?
2. *Fuselage.*
   a. How would you distribute landing gear stresses?
   b. How and where would you place loads?
   c. Have you any suggestions for carrying mails?
   d. Would you alter present type of tail skid? How?
   e. Should skid be steerable from rudder bar.
3. *Wings.*
   a. State ideas for wing construction.
   b. What factor of safety?
   c. Have you any changes to suggest in wing skids?
   d. What wing loading do you think advisable?
4. *Landing Gear.*
   a. Give desirable factor of safety?
   b. Where place?
   c. Do you think three strut landing gear visable?
5. *Controls and Control Surfaces.*
   a. "Dep" or stick?
   b. Should controls be accessible in flight?
   c. Should all control surfaces be balanced?
   d. Do you think stabilizer should be hinged?
6. *Gas and Oil.*
   a. Should each motor have independent gas and oil?
   b. What feed system should be used?
   c. Do you recommend accessibility for all valves and leads during flight? How placed?
   d. How should gas and oil tanks be anchored and where placed?
   e. How would you provide leads against vibration?
7. *Safety and Comfort of Crew.*
   a. Should pilot and mechanic, if any, be placed before or behind the main load?
   b. Should cock-pit be enclosed or open?
   c. How should cock-pit be heated for winter flying?
   d. Should there be passageway through fuselage to vital parts?
   e. State in detal your ideas for location of controls, instruments, seats and the amount of room available in cock-pit.
   f. Can you suggest an adequate fire extinguisher system?

French Aerial Mail Service Officially Started

Paris—On March 1st the French aerial mail service between Paris and Bordeaux, Marseilles, Toulouse, Brest and St. Nazaire, under the supervision of the director of civilian aeronautics, was officially inaugurated.

Post Office Receives Bids for DH-4 Changes

Abstract for bids for changing and modifying 12 De Haviland 4 aeroplanes and as many more up to 60, in lots of 12, as the Postmaster General may direct. Opening of bids took place February 26, 1919.

Bidder	Price, each	Total
Curtiss Engineering Corporation, Garden City, L. I., New York.....	$1,975.00	$23,700.00
Aircraft Engineering Corporation, New York, N. Y..........	3,484.65	41,815.80
Wittemann-Lewis Aircraft Co., Newark, N. J.	3,400.00	40,800.00
L-W-F Engineering Co., Inc., College Point, L. I., New York. Wooden landing gear	996.50	11,958.00
Nickeled steel landing gear	1.462.00	17,544.00
Continental Aircraft Corporation, 120 Liberty Street, New York, N. Y.........	2,325.00	27,900.00
West Virginia Aircraft Company, Wheeling, West Virginia.......	1,830.00	21,960.00

To Manufacture Aeroplane Parts

Newark, N. J.—John Cozzone & Co., of 61 Arlington Street, Newark, N. J., have purchased a factory site at which they are preparing to undertake the manufacture of aeroplane parts. The factory is located at 55 Branford Street, Newark.

Personal Pars

Charles B. Wilson, president and manager of the Wilson Foundry and Machine Company, Pontiac, Mich., has been elected vice-president of the Curtiss Aeroplane and Motor Corporation, Buffalo, N. Y.

Hydro-Aeroplane Garage for New York

A new venture is announced by Henry Amerman, attorney for a group of men headed by I. M. Uppercu, president of the Aeromarine Plane and Motor Company. It is proposed to build a public flying boat service station—a hydroaeroplane garage—at 181st Street and the Hudson River, at Fort Washington Point.

Mr. Amerman stated that the venture is being projected merely to encourage water flying and the private ownership of air yachts. The station will be a garage only. There is no intention of participation in passenger-carrying lines or anything of that nature other than to sell 'planes and rent hangars. However, the establishment of schools will be encouraged, as will sight-seeing airboat lines, air yacht taxi companies, etc.

The founders of the idea are hopeful that the project will be taken up throughout the country and that other plants will be established. This would be profitable as the spring will probably find many aircraft concerns seeking locations for selling agencies. It would be natural for them to choose those places already provided with municipal or privately-conducted service stations.

Cited for Distinguished Service

The Commander-in-Chief, in the name of the President, has awarded the distinguished service cross to the following-named officers and soldiers for the acts of extraordinary heroism described after their names:

First Lieut. Elliott, White Springs, Air Service. For extraordinary heroism in action near Bapaume, France, August 22, 1918. Attacking three enemy planes (type Fokker), who were driving on one of our planes, Lieut. Springs, after a short and skillful flight, drove off two of the enemy and shot down the third. On the same day he attacked a formation of five enemy planes (type Fokker), and after shooting down one plane was forced to retire because of lack of ammunition. Home address, Leroy Springs, father, Lancaster, S. C.

Sergt. (first class) Harold O. Nicholls, Balloon Service, First Army (A. S. No. 36238). For repeated acts of extraordinary heroism in action near Griscourt, France, August 11, 1918; near Avecourt, France, October 1 and 9, 1918. On August 11 Sergt. Nicholls volunteered and ascended for the purpose of making observation. He continued with his work until the balloon was set on fire by attacking enemy planes. On October 1 he remained on duty until his balloon was fired by incendiary bullets, and again on October 9, while on duty with another observer, he remained with his balloon under attack until it was set on fire by enemy planes, and he then refused to jump until his companion had escaped. Home address, Mrs. Helen Nicholls, 1716 Avenue C, Galveston, Tex.

First Lieut. Leo H. Dawson, Air Service, 94th Aero Squadron. For extraordinary heroism in action near Hartennes, France, July 19, 1918. While on a voluntary patrol, Lieut. Dawson encountered seven enemy monoplanes at an altitude of 2,000 meters. After a brief engagement his guns jammed, but, after repairing the jam in the air and under heavy fire, he returned to the fight, shot down one of the enemy in flames and drove off the others. For the following act of extraordinary heroism in action near Clery-le-Petite, France, November 4, 1918, Lieut. Dawson is awarded a bar, to be worn with the distinguished-service cross: Sighted four enemy planes (type Rumpler); Lieut. Dawson immediately attacked, despite the numerical superiority of the enemy, and destroyed one of the group, whereupon the remaining three scattered and returned to their lines. Home address, Mrs. A. G. Dawson, 942 Ogden Street, Denver, Colo.

THE THOMAS-MORSE MODEL 8-90 AERO ENGINE

Type Eight cylinder "V", four cycle, water cooled. Propeller driven through reduction gearing. Bore: four and thirteen sixteenths inches. Stroke: six inches. Brake Horse Power at propeller shaft: 250. Engine R.P.M.: 2,200. Propeller R.P.M.: 1,512. Gasoline Consumption: .54 lbs. per H.P. hour. Oil Consumption: .04 lbs. per H.P. hour. Weight of engine, complete with propeller hub, flanges and bolts, carburetor mounted, two magnetos, gasoline supply pump but without radiator, water, oil, starting device, exhaust pipes or propeller: approximately 590 lbs.

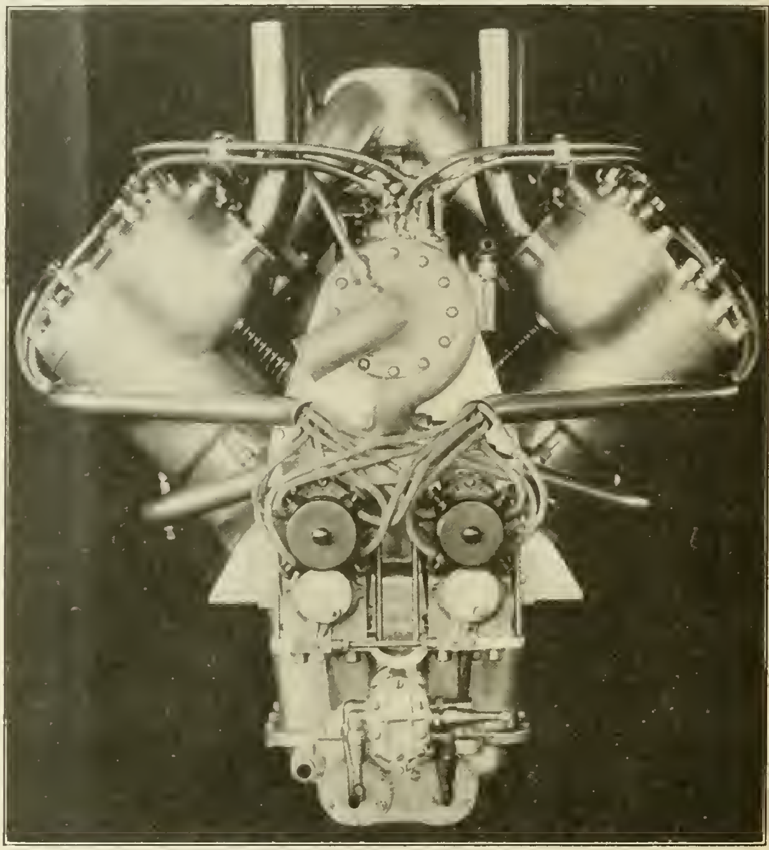
Cylinders—The cylinders are of the "L" head type. Cast in blocks of four each of special non porous, high tensile strength aluminum alloy. The integral water jackets are designed to provide ample space around all parts of the cylinder. The cylinder feet are of sturdy proportions with holding down bolts close to the cylinder barrels. The cylinder heads are bolted on, an ample number of studs evenly and closely spaced being used for this purpose. The cleaning out of the carbon and the grinding of valves and the general inspection of cylinders and pistons is thus greatly facilitated. Cast iron is used for the liners, fitted to the cylinder barrels, as no material has been found to equal it for wearing qualities.

Valve and Valve Mechanism—Valves are of Tungsten steel, made in one piece without welding and have a clear port opening of two and thirteen sixteenths inches. Valve springs are of special alloy steel to insure continuous service under the most severe conditions. The valve push rod guides are held in the cylinder feet. The push rods made of hardened tool steel are operated directly by the cams without intervening cam rockers and are provided with means for adjustment, making a light, durable and simple valve operating mechanism. Special provision prevents oil leakage at the push rods

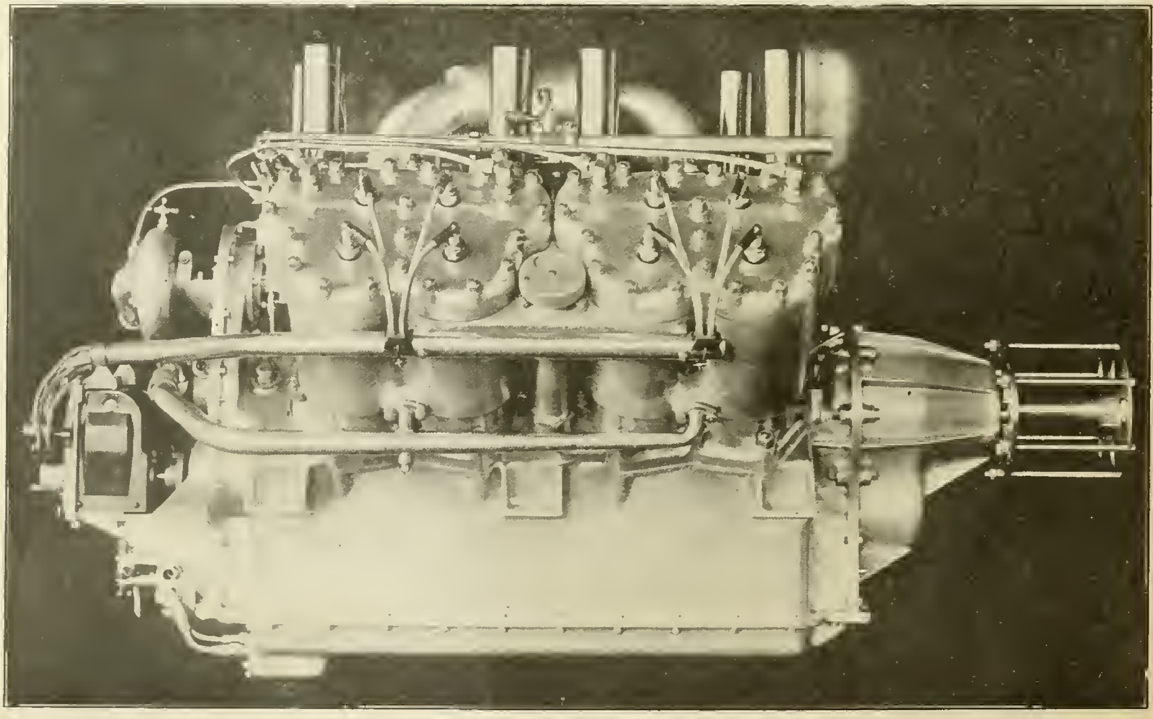
Camshaft.—The three bearing camshaft, with its sixteen integral cams hardened and ground to size, is located in the crankcase between the two banks of cylinders. To insure rigidity and long life to the camshaft bearings, it is made of generous size and drilled for lightness. The special phosphor bronze bearings are lubricated by high pressure force feed, directely from the main oil duct. The driven end of the camshaft is flanged for bolting to the timing gear.

Timing Gears—The two timing gears, with spur cut teeth, are made of chrome nickel steel, heat treated. The camshaft gear is bolted to the flanged end of the camshaft. Lubrication is provided by overflow of oil through the pressure regulating relief valve, situated adjacent to the timing gears at the end of the high pressure main oil duct

Crankshaft The four throw crankshaft made of special chrome nickel steel, is carried on three bearings of liberal length. Journals and



The Thomas-Morse Model 8-90 Aero Engine



The Thomas-Morse Model 8-90 Aero Engine

crankpins are two and one-half inches in diameter, drilled for lightness and plugged for the high pressure force feed lubrication system. The crank webs are also drilled and plugged to lead oil to the connecting rod big ends.

Connecting Rods—The connecting rods are of H section, arranged side by side on the same crank pin for opposite cylinders. They are made from a special grade of heat treated, chrome nickel steel, having a very high elastic limit, and are machined all over, securing exceptionally light weight and uniform balance. The big ends are babbitt lined; the babbitt being applied directly to the rods and forming an integral part of them. The wrist pins are locked in the connecting rods and swing in liberal bearings in the piston bosses.

Pistons—The pistons made of special aluminum alloy are light in weight and have well ribbed heads for strength and cooling. Two concentric lap jointed compression rings are located near the head, while one oil scraper ring is carried in the skirt. The piston pin is made of chrome nickel steel, drilled hollow, park hardened and ground to size.

Crankcase—The crankcase is a special aluminum alloy casting of deep sided section, well ribbed for strength and rigidity. The lower half serves only as an oil pan or sump and is bolted directly to the upper half.

Carburetor— Stromberg, double vertical carburetor is used, bolted to a water jacketed cast aluminum double branch manifold, serving the two banks of cylinders. All manifold bends are of large radii.

Lubricating System—The lubricating system is of the high pressure, circulating type. A gear pump located within crankcase and driven from the crankshaft timing gears draws oil from an oil supply tank located at any convenient place near the engine through a fine mesh wire screen which is integral with the pump. Oil is delivered from the pump to a main oil duct, also located within the crankcase. Drilled holes in the main bearing supporting webs, connecting with this duct lead the oil directly to the three crankshaft bearings. The connecting rod big ends receive oil through the drilled crankshaft webs and crank pins. Oil is carried up from the main duct to the front camshaft bearing and from there through the hollow camshaft to the other two bearings. The wrist pins and pistons, cams and push rods are lubricated by the oil thrown off the crank pins. The reduction gears are constantly sprayed with a stream of oil from the main oil duct. A gear pump mounted on the timing gear cover is so designed that all surplus oil collecting in either end of the oil pan is drawn off through large, fine mesh, readily removable screens and delivered back to the supply tank.

Water Cooling System—A single centrifugal water pump is driven at crankshaft speed by a steel gear meshing with the camshaft timing gear. Equal water distribution to both banks of cylinders is insured by a siamese outlet from the pump to the brass water pipes at the base of the cylinder jackets. Water outlet connections are arranged over each exhaust valve. All water pipes are fitted close to the cylinders for rigidity and economy of space. Only four hose connections are necessary with each motor.

Propeller Drive—The propeller shaft is driven from the crankshaft through the two spur gears of the highest grade chrome nickel gear steel, heat treated. It is rigidly supported on three large annular ball bearings housed in a well ribbed aluminum alloy gear case, which is bolted to the crankcase. The shaft is of exceptionally large diameter and drilled to secure light weight.

Ignition System—Two Splitdorf "Dixie" Magnetos are used, each constituting an entirely independent ignition system with two spark plugs per cylinder. They are arranged side by side and driven at crankshaft speed by spur gearing at the rear end of the crankshaft. This position insures their operation under the most favorable conditions, besides providing ready accessibility. Provision has been made to allow the use of "Dixie 84" magnetos, equipped for advancing and retarding the spark or fixed spark "Dixie 810" magnetos and hand starting magnetos.

Self Starter—Provision has been made in the design for the application of the Christensen air starting system when desired. The starting unit is located between the two banks of cylinders and is driven at crankshaft speed by a steel gear engaging the camshaft timing gear. In its application to the Thomas Motor, no drive shaft is exposed, thus eliminating all chances of oil leakage. The starter is composed of four principal parts: An air pump in operation only when compressing air for storage purposes; an automatic carburetor, which supplies gasoline to the air distributed to the cylinders; an automatic distributor, which is in action during the starting period only; and a compressed air tank. The piping to the cylinders is short and direct. The entire apparatus weighs approximately 40 lbs.

Additional Equipment—A gasoline gear pump is supplied as regular equipment. It is situated near the base of the motor and is therefore gravity fed. A tachometer drive is also supplied.

LINE REAMING CRANK SHAFT BEARINGS OF LIBERTY MOTORS

By A. A. MARTELL, Chief Engineer, Taft Pierce Mfg. Co.

PUTTING the manufacture of the Liberty motor on a production basis marked a considerable step in advance of the best American practice in regard to accuracy of machine work on the component parts and also assembling the details, where unusually close limits were employed, into a smooth working and efficient engine.

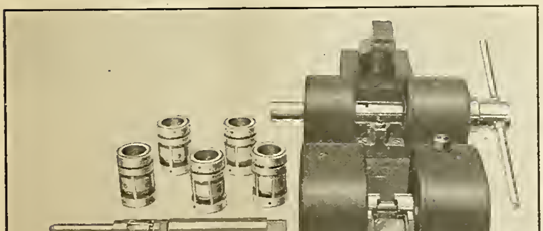
Some one of our illustrious ancestors was so impressed with the value of attention to detail that he broke out in a famous poetical recital of the loss of an important battle due to the failure of a despatch bearer to deliver his message on account of a missing nail in his horse's shoe, thereby starting a train of misfortunes that resulted in a 100 per cent loss, so far as delivering the goods was concerned.

Considering the task that the aeroplane was called upon to perform, the very best we had in machinery and skill was none too good to meet the tremendous requirements.

One of the most vital parts of any motor is the crank shaft and the bearings in which it revolves. Particularly is this true of aviation motors that are continuously run with an open throttle delivering every ounce of power of which they are capable.

The accompanying cuts show the crankcase of the Liberty motor. Note the long studs that bolt the two halves together, locking them firmly and securing a great degree of strength with little weight.

The device used for these reaming bearings is shown resting in the half bearings, in the same relative position it occupies when performing the actual reaming operation, which, of course, is done while the upper and lower halves of the cases are bolted together.



Connecting rod fixture for reaming

This reaming equipment is known as the Martell Aligning Reamer and was very successfully used on practically all Liberty motors. The operation was performed in an average time of 30 minutes per motor. The size of holes, alignment and surface of bearings passed the most rigid inspection and tests.

To briefly describe the construction of the reaming system and method of operation.

The reamer bar is made of a special steel, pack hardened, ground and lapped. It has two grooves, on opposite sides, and recesses are milled at proper intervals along both grooves to receive the ends of driving screws that, screwing through the body of the reamers, project slightly into the bore.

This bar is supported by two plain, hardened bushings, which are snugly fitted to and held in the core of the bearings Nos. 1 and 7.

To insure the perfect alignment of the bar, there are two other bushings used in bearings 3 and 5, respectively. These bushings are of special construction, consisting of two eccentric bushings, one within the other, the assembly being completed by an outer sleeve, which receives the two eccentrics. A portion of the surface of this outer sleeve is tapered and carries in fine thread, 72 per inch.

This sleeve screws firmly into the soft metal of the bearings and forms a solid anchor for the eccentrics, which are manipulated until the bar is in absolute alignment.

The reamers are then slipped on the bar, partially withdrawing it, the bar, first from one end and then the other, so that the adjustment of the centering bushings will not be disturbed.

The reaming is done by hand, as indicated by the double end wrench shown on the bar.

The design of the reamers present some novel features of construction. The blades, at their two ends, rest upon hardened and ground wedges, the under surface of the blades being carefully ground to the same angle as the wedges.

The blades are held firmly by means of two adjusting nuts, one at each end, whose inner edges are conically ground to receive the ends of blads which are also ground to a like angle.

There are 6 blades, 4 of them are set at a slight left hand angle in the axis of the reamer, and two are set to a corresponding angle in the opposite direction.

This disposition of cutting edges prevents chattering and produces holes that are round to within .0001.

The design of the expanding mechanism makes it possible to correct variations as small as .0002 or .0003. These corrections are easily and quickly made by simply adjusting the nuts at the two ends of blades. The rear nuts are graduated to .00025 to aid this operation.

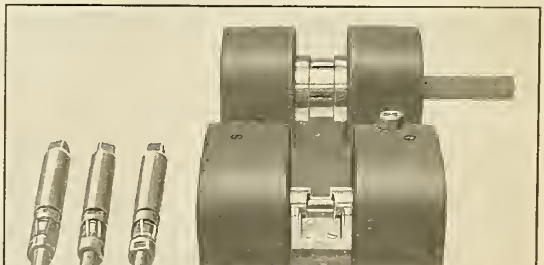
On the Liberty motor the only means of access to the bearings was through the openings provided for the cylinders. This construction naturally handicapped the operators, and it speaks well for the loyal application of the men on the job as well as the ingenious features of the tool that they "carried on" and did their bit to take the germ out of Germany.

Reaming the connection rods presented another interesting feature, and the accompanying cuts show the method of procedure.

The illustration shows the fixture for reaming both ends of the worked rod at one setting.

A hardened and ground steel hinged clamp, accurately located, held

(*Continued on page* 1353)



Connecting rod fixture for reaming

NAVAL *and* MILITARY AERONAUTICS

Demobilization

The War Department authorizes the following statement:

The "honorable discharge" emblem to be issued by the War Department will be a bronze lapel button somewhat similar to the G. A. R. button of like significance. It is the intention of the Government to distribute the button free of charge to all entitled to it. The buttons will be manufactured only by concerns chosen by the Government, which will furnish the dies for their manufacture and purchase the buttons, thus obviating any possible variance from the approved pattern in design, color or material.

Of appropriate and artistic design, the button is the result of a competition among American artists and sculptors, conducted by the Commission of Fine Arts, of which Charles Moore is chairman, and the following are members: Herbert Adams, J. Alden Weir, Charles A. Platt, William Mitchell Kendall, John Russell Pope, James L. Greenleaf, and Col. C. S. Ridley, secretary. Fifteen designs were submitted by the Commission for final selection by the Chief of Staff.

Overseas Troops Arriving

The War Department authorizes publication of the following:

The cruiser Frederick sailed from Brest February 19 and is due to arrive at New York March 1, with the following Air Service troops: 95th Aero Squadron, 5 officers, 165 men; 103d Aero Squadron, 6 officers, 174 men; 465 Aero Squadron, 3 officers, 126 men; 835th Aero Squadron, 2 officers, 145 men; 109th Aero Squadron, 4 officers, 126 men.

The transport Mexican sailed from St. Nazaire February 20 and is due to arrive at New York March 5, with the following troops: 2 officers, 121 men, New York; 1 officer, 130 men, Camp Upton; 23d Aero Squadron, 2 officers, 158 men; 35th Aero Squadron, 2 officers, 137 men; 149th Aero Squadron, 2 officers, 154 men; 151st Aero Squadron, 1 officer, 150 men; 153d Aero Squadron, 2 officers, 152 men; 158th Aero Squadron, 1 officer, 153 men; 173d Aero Squadron, 2 officers, 152 men; 176th Aero Squadron, 1 officer, 156 men; 184th Aero Squadron, 1 officer, 147 men; 247th Aero Squadron, 1 officer, 150 men; 264th Aero Squadron, 2 officers, 153 men; 469th Aero Squadron, 2 officers, 115 men; 374th Aero Squadron, 1 officer, 147 men; 499th Aero Squadron, 2 officers, 146 men; 500th Aero Squadron, 2 officers, 148 men.

The transport Sibone, which sailed from Bordeaux February 20 and is due to arrive at New York March 3, has on board 14 Air Service officers.

The transport Lake Gaspar sailed from Bordeaux February 20 and is due to arrive about March 8 with 1 casual officer, Air Service.

Transport Ceylon Maru sailed from Bordeaux February 20 and is due to arrive at Newport News March 7 with 1 casual officer, Air Service.

Transport Moccasin sailed from Brest February 20 and is due to arrive at New York March 4 with the following troops: 1 casual officer, Air Service.

The battleship Ohio, which sailed from Brest February 20, and is due to arrive at Newport News March 5, carries 2 casual officers of the Air Service.

The transport Buford sailed from Bordeaux February 17 and is due to arrive at Newport News March 4, with 1 casual officer, Air Service.

The cruiser Rochester sailed from Brest February 17, and was due to arrive at New York about February 25 with the following troops: 467th Aero Squadron, 4 officers and 133 men, divided as follows: 4 officers, 108 men, Camp Upton; 25 men, Camp Taylor; 1 casual officer, Air Service.

The transport Olympic sailed from Brest February 18 and was due to arrive at New York February 25 with 13 casual officers of the Air Service.

The following organizations have been assigned to early convoy: 99th Aero Squadron, Air Service Casual Co. No. 5.

Another American Ace

Lieut. J. O. Donaldson recently recommended for Military Aviator rating by the Division of Military Aeronautics' Rating Board, has been announced as an Ace, "having brought down five planes officially noted as crashes and three officially out of control." Lieut. Donaldson was not included in the first list of 63 Aces received from General Pershing; but, owing to recent confirmations from British commands with which he flew, a positive record that he brought down at least five planes is now on file in the Air Service. Lieut. Donaldson is a Washington man who took the Ground School Course at Cornell University and completed his flying training with the British. He was attached to a British Squadron when he was forced to land within the German lines. He was captured, but later escaped.

Lieut. Donaldson received the D. F. C.—the British Distinguished Flying Cross.

Preparing Air Biographies

On February 1, 1919, the Director of Military Aeronautics sent the following letter to the presidents of all universities and colleges in this country:

"The Director of Military Aeronautics asks your co-operation in the following matter, which is important to the Air Service of the country and which may be of yet more intimate concern to the locality and to the institution with which you are associated.

"This office is making every effort to assemble the personal stories of the men who have been with the Air Service overseas. It seems not unlikely that the better part of each story is contained in letters to friends and relatives at home. Letters from some of our aviators have already appeared in book form and in the magazines, and from time to time college publications have had occasion to print appreciations of fliers killed in combat.

"Such informal records may supply information of historical value to be had from no other source—information which should find a place in the written history of the country.

"The Director of Military Aeronautics therefore makes this request: That, with the full sanction of those most concerned, this office be furnished with copies of such letters, or excerpts from them, and likewise with copies of any of your student or alumni publications that have contained articles pertinent to this subject. It would be gratifying, also, if you would interest your townspeople in this matter, and would obtain the co-operation of the local press. Whatever you can do to further the assembling of this data—and with reasonable haste, that nothing may be lost—will be deeply appreciated here.

"Communications in reply should be addressed:
"Director of Military Aeronautics,
"Sixth Street and Missouri Avenue,
"Washington, D. C.
"Aeronautical Information Branch."

For a History of the War

On February 25 the War Department authorized publication of the following:

"The Secretary of War has directed that a bulletin be published to the Army to provide that officers and other persons who have served in or with the Army during the war and who are in possession of historical information of value for use in connection with the history of the war are authorized and invited to communicate such information direct by mail or otherwise to the Chief of the Historical Branch, Army War College, Washington, D. C., such material to be considered as having been furnished to the War Department unconditionally, to be used as desired and not to be returned unless request is made to do so.

"The request from the O. D. M. A. has brought assurance of co-operation from a source from which not a little might be expected. The material as received will be sifted and classified, and copies will be furnished the Historical Branch of the War College. It is desired to give all the publicity possible to this appeal from the Air Service.

"Remember, this war, too, must find its Lossing and McMaster. So officers and men in the camps who have material, in letters or other form, of the sort that goes to make histories should think to send a copy to the O. D. M. A.

"Attention Aeronautical Information Branch."

Ratings of Fliers

Major Melvin A. Hall, A.S.A., is appointed a member of the Board of Officers created by Paragraph 3, Special Orders No. 28, Division of Military Aeronautics, February 1, 1919, to pass on the qualifications of flying officers who have distinguished themselves in action, with a view to awarding them such ratings as their achievements and abilities may warrant. Major Hall is appointed vice Colonel Townsend F. Dodd, M.A., A.S.A., relieved.

Lieut. Col. Bruce B. Buttler, A.S.A., has been ordered to report at Kelly Field, San Antonio, Texas, on March 15, 1919, for examination for rating as Junior Military Aviator.

The following-named officers, having completed the required tests, are rated Reserve Military Aviators, to be effctive from the dates set after their respective names:

Second Lieut. Warren E. Calvin, A.S.A., January 20, 1919.

Second Lieut. Cyril R. Davis, A.S.A., January 20, 1919.

Second Lieut. John H. Matthews, A.S.A., February 7, 1919.

Licenses to Fly Civilian Aircraft

Licences to fly civilian aircraft issued by the Joint Army and Navy Board on Aeronautic Cognizance, up to and including February 24, 1919, are as follows:

License No.	*Issued to*	*Address*
301	Marjorie Stinson,	122 King Avenue, San Antonio, Tex.
302	Theodore Hedlund,	Boston, Mass.
303	Louis Gertson,	Chicago, Ill.
304	Baxter H. Adams,	Henderson, Ky.
305	David Gregg,	Brookline, Mass.
306	Edwin K. Jaquith,	Atlantic City, N. J.
307	Curtiss Flying Station,	Atlantic City, N. J.
308	Walter Pack,	San Francisco, Cal.
309	Leon Richardson,	Washington, D. C.
310	W. H. Fitzpatrick, Jr.,	Buffalo, N. Y.
311	Walter T. Varney,	San Francisco, Cal.
312	Clarke C. Minter,	Washington, D. C.
313	W. E. Nightingale,	Nantasket, Mass.
316	J. Riley,	Caro, Mich.
320	Harry B. Crewdson,	Chicago, Ill.
321	Warren L. Baker,	Providence, R. I.
322	Allen P. Bourden,	East Greonwich, R. I.
323	John O'Mara, Jr.,	Brooklyn, N. Y.
324	Ed R. Hutchison,	Elmira, N. Y.
326	Curtiss Aeroplane & Motor Corp.,	New York, N. Y.
327	B. H. Kendrick,	Atlantic City, N. J.
328	Prof. Rexford C. Gardiner,	Celoron, N. Y.
330	Frank Bonar,	Underwood, Iowa.
331	Charles T. Mills,	La Salle, N. Y.
332	America Trans-Oceanic Co. (David H. McCullock),	New York, N. Y.
333	Frank Mills,	Essington, Pa.
335	Walter W. Rauh,	Salem, Ohio.
336	A. W. Snyder,	Bolling Field, D. C.
337	Howard A. Scholle,	New York, N. Y.
338	Melvin W. Hodgdon,	Somerville, Mass.

Licenses renewed:

License No.	*Issued to*	*Address*
117	The Lawrence Sperry Aircraft Co.,	Farmingdale, L. I.
176	Dewey Airplane Company,	Dewey, Okla.

Types of Planes Active, Obsolescent, or Obsolete

The following types of planes are declared by Circular No. 5, O. D. M. A., February 21, 1919, "active," "obsolescent" and "obsolete":

ACTIVE

Planes	*Motors*
Curtiss JN4H (JN4HB)	Hispano Suiza Model I
Curtiss JN6HO	
(JN4HG)	Hispano Suiza Model E.
Curtiss JN7H (JN6HB)	Liberty-12
DeHaviland 4 (JN6HP)	LeRhone 80 HP
USD9A ((JN6HG1)	
SE-5 (JN6HG2)	
VE-7	
S4-C	
Martin Bomber	
Hydros	
Lepere	
Handley Page	
Spad	
Sopwith Dolphin	
Caproni	

OBSOLESCENT

Planes	*Motors*
Curtiss JN4A	Curtiss OX2
Curtiss JN4B	Curtiss OXX3
Curtiss JN4D	Curtiss OX5
Canadian JN4	Hispano Suiza Model A

Thomas Morse Scout equipped with Gnome Motor

OBSOLETE

Planes	*Motors*
Curtiss R4	Thomas Morse -8
Curtiss R2	Curtiss Model -0
Curtiss N8	Curtiss OXX
Curtiss Twin	Curtiss OXX-2
LWF	Curtiss N-8
Standard J-1	Sturtevant 5-A
L-2	Hall Scott A5A
R-6	Hall Scott A7A
Martin -R	Lawrence

Standard D
Heinrich C-1
Aero Marine
Boeing
Martin TT
Martin R6
Standard H-2
Standard H-3
Sturtevant S-4
Bristol Fighters
Burgess Hydroplane

Clerget -9
Curtiss V-2
Curtiss V-X
Wright 6-cyl.
Salmson M-9
Renault -12
Renault -8
Sturtevant 4-cyl.
Aero Daimler 6-cyl.
Curtiss Type S
Laviateur -8

The following is the policy in regard to operation and repairs of obsolescent planes and engines:

(a) Obsolescent planes and engines will be operated and used in active training until through accident or fair wear and tear they are put out of commission.

(b) Where necessary spare parts are available at a Flying Field or Repair Depot, obsolescent planes and engines will be repaired and put back in commission.

(c) Where the necessary spare parts for making repairs are not available at a Flying Field or Repair Depot, they will be requisitioned on the supply source, which source will obtain them, if possible, from other Flying Fields, Repair Depots or Supply Depots in cases where there are none at the supply source upon which the requisition was issued.

(d) Where obsolescent planes and engines are out of commission on account of the lack of spare parts which may be easily manufactured at the Flying Fields, it will be left to the judgment of the Commanding Officer as to whether or not it is advisable to make the necessary parts to complete the repair. No extensive repairs, however, will be made.

(e) No spare parts will be purchased or manufactured other than as indicated in paragraph (d).

(f) After Surveys and Salvage Reports have been properly executed, parts from planes and engines out of commission on account of lack of spare parts will be used as spare parts for making repairs to other similar planes and engines which may be put in commission by the use of parts from the planes so surveyed and salvaged.

The policy regarding the disposition of obsolete planes will be announced later.

Flying Data

Aeroplane daily crew reports from flying fields yield some interesting summaries, according to tabulation by the Information Records Branch of the Supply Section for the month of December, 1918. Here are some of the totals for the 27 flying fields considered as one. Decimals for the larger numbers are omitted.

For All Fields

Total hrs. per mo. Engine running time	49,745
Total hrs. per mo. Aeroplane flying time	44,759
Average number ships per day........	531
Total gals. gas per mo. put in.........	320,938
Average gals. gas per ship per hr......	6.45
Total qts. oil per mo. put in..........	111,966
Average qts. oil per ship per hr.......	2.25
Qts. used oil returned................	11,362

Travel for Aviation Purposes

Section III of G. O. 22 W. D., February 6, 1919, amends Section III of G. O. 81 W. D., 1918, as follows:

"Actual and necessary expenses, not exceeding $5 per day, may be paid from the Signal Corps appropriation of July 24, 1917, or from the Air Service appropriation of July 9, 1918, to officers, enlisted men, and civilian employees of the Army, and authorized agents when sent on special duty for aviation purposes at home or abroad under specific instructions from the Secretary of War."

It also announces that "Vouchers submitted for payment under the provisions of this order will be accompanied by an itemized statement of expenses."

It is to be noted that this change in General Orders has the effect of stopping reimbursement for expenses of any special duty for aviation purposes not authorized by the Secretary of War. Also, that actual expenses and not a per diem allowance will be paid, and that reimbursement will not be made for expenses in excess of $5 a day.

The officer in charge of Airship Training and Instruction at Akron, Ohio, is announced as Commanding Officer of a Balloon School, for the purpose of issuing travel orders in cases of officers, returning from free balloon flights.

The "Family Medicine Book" for Motor Troubles

A pamphlet on Motor Trouble Shooting, issued by the Training Section, has been sent to the various flying fields for the use of pilots in cross-country flying.

The compilation of this pamphlet stands to the credit of Second Lieut. Curtis C. Wehh, Assistant Engineer Officer at Ellington Field, who did all the detailed work on it.

The pamphlet is a well-set-up pocket edition of about twenty pages, excellently printed and well laid out. Each "trouble" has a page to itself, where it is diagnosed in itemized form. Directions for starting Hispano-Suiza and Liberty engines and a few general rules precede.

Over 210 Hours in the Air

Ream Field boasts a JN4-H with a record of 210 hours and 20 minutes actual flying time without once having had its motor overhauled.

According to the Rockwell Field *Weekly Flight*, "this ship put in over 95 hours in combat work—conceded to be the work placing the heaviest strain on a ship—was mounted with a Marlin machine gun and used in tow target work and parachute drill, and answered in full every call on it without the mar of a single forced landing."

The chauffeur, one of Ream Field's best motor mechanicians, who was in charge of the plane throughout its entire course, was given permission to make an exhaustive endurance test of it. It was generally conceded that the machine was good for thirty or forty more hours, but the officers in authority decided that it should be stripped, the motor taken apart and photographed in detail and its history studied for the benefit of further motor construction.

Lieut. Col. William Thaw, now at Rockwell Field, has been designated Post Executive Officer.

Outstanding Contracts

The Statistics Branch, General Staff, War Department, announces the values of contract terminations and deliveries for the Army Air Service to February 8, in percentage of contracts outstanding November 9, 1918.

No allowance for settlements has been made. Value of suspensions as well as of cancellations are included in terminations.

The figures are: Terminated, 82.5 per cent.; delivered, 15 per cent.; balance, 2.5 per cent.

Recent Naval Orders

Lieutenant Louis E. Thornton, to duty under public works officer, naval air station, Pensacola, Fla.

Lieutenant (junior grade) J. R. Gibson, to duty in command of naval air station, Marginal Parkway, Brooklyn, N. Y.

Lieutenant John A. Davis, to duty as inspector of engineering material, U. S. N., Curtiss Aeroplane and Motor Corporation, Buffalo, N. Y.

Lieutenant (junior grade) J. A. Eaton, to duty naval air station, Rockaway Beach, L. I.

Lieutenant John S. Fulton, Jr., to duty office of naval operation aviation, Navy Department.

Lieutenant William B. Atwater, to duty as aviation aide Sixth Naval District.

Lieutenant J. W. Brown, to command the N-5.

Lieutenant R. D. Bussdicker, Avia., Pauillac, to Pauillac, connection Crew No. 3.

Lieutenant (junior grade) James S. Cuff, to duty U.S.S. N-2.

Lieutenant Commander W. R. Sullivan, Avia., Queenstown, to Base No. 18.

Lieutenant B. V. Eckhout, designated as Nav. Aviator.

Lieutenant P. J. Piccirilli, from Curtiss Aero and Motor Corp., Buffalo, N. Y., to duty, Nav. Yard, Washington, D. C.

Lieutenant A. Tucker, to duty in Construction and Repair Department, Nav. Station, Pensacola.

Lieutenant Edwin S. Parsons, to duty in command naval air station, Bayshore, L. I., N. Y.

Lieutenant Commander Nathan B. Chase, to duty Brunswick, Ga., report commanding officer naval air station temporary duty and for duty command upon det. of present commanding officer.

Lieutenant W. T. Hopkins, Avia., Brest, to Base No. 7.

Lieutenant Julian A. Ducray, to duty as executive officer naval air station, Miami, Fla.

Lieutenant Commander James C. Monfort, Naval Air Station, Rockaway, L. I., as executive officer.

Lieutenant (junior grade) James S. Cuff to U. S. S. N-2.

Lieutenant Commander Harold C. Van Valzah, to Miami (Fla.) Naval Air Station.

Lieutenant Thomas R. Cooley, to rejoin U. S. S. Florida.

Lieutenant Lyman K. Swenson, to U. S. S. R-17.

Lieutenant Lewis J. Strecher, to U. S. S. R-2.

Commander William B. Waite, Jr., to R-S, at New York.

Lieutenant Scott Umsted, to command U. S. S. N-2, on detachment of Lieutenant Commander Frazer.

Lieutenant Alva J. Moore, to duty U. S. S. R-3, and on board when commissioned.

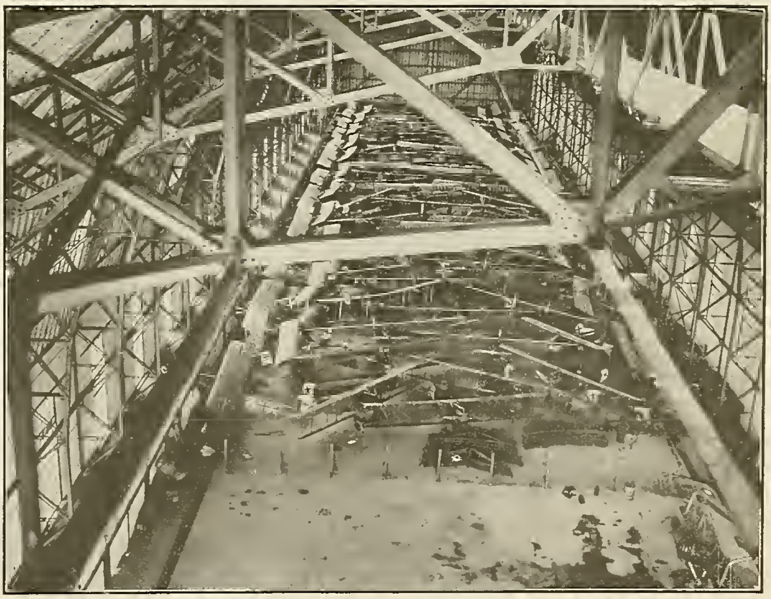
Lieutenant Commander Charles M. Elder, to duty U. S. S. R-6, and in command when commissioned.

Lieutenant Benjamin H. Page, to command U. S. S. N-3.

Lieutenant (junior grade) Walter S. Mallory, to duty U. S. S. N-1.

Lieutenant (junior grade) Richard T. Guilbert, to duty U. S. S. A-4.

Lieutenant (junior grade) Roderick T. Smith, to command U. S. S. D-2, upon detachment of Lieutenant Chamhers.



German machines turned over to the Allies under the armistice terms

FOREIGN NEWS

Royal Air Force Making Observations for Transatlantic Flight

London. In a few weeks box kites carrying delicate instruments will be flown from the sterns of Atlantic liners on the various routes between England and the United States. This is to be part of a world-wide plan for recording conditions in the upper air, says the Daily Mail.

The kites are owned by the meteorological section of the British Royal Air Force. They are expected to fly at a great height and to furnish information of incalculable value to prospective transatlantic aerial pilots.

Italian Aeronautic Mission to Argentina

According to information received in Buenos Ayres, an Italian Aviation Mission, composed of four officers and several aeronautic experts, is leaving for Argentina to assist in the development of military and commercial aviation.

Dagoberto Godoy Flies Over Andes

Dagoberto Godoy, a Chilean aviator, flew from Argentina across the Andes to Chile on December 19 in a Bristol biplane. An altitude of 17,300 feet was attained during the flight. The Chilean Government has awarded a prize of 50,000 pesos (about $18,000) to the first aviator accomplishing this feat. The Military Club tendered Godoy a sumptuous banquet in celebration of his feat.

Prince Albert to Qualify for His Wings

Prince Albert of England, who for some time has been attached to the Royal Air Force and has made many flights as a passenger, is going to complete training for his wings at R. A. F. Headquarters at St. Andree, 45 miles from Bologne. A special Avro 504 type machine has been huilt and flown to the field from the Avro factory at Hamble.

Aerial Transport for Africa

A company has been organized in London for the establishment of aerial landing places and hangars and for the manufacture and sale of aircraft in Africa, having a capitalization of $3,000,000 and bearing the name of Aircraft Corporation of Africa, Ltd.

Looping Record Reported Broken

Issoudon, France.—Lieut. Joyce, of the testing department of the Third Aviation Instruction Center, is reported in *Plane News* as having executed 300 consecutive loops in 66 minutes. The feat was performed in a Morane monoplane with a 120 h.p. Le Rhone motor, an average altitude of 2,000 feet being maintained. 24 minutes 30 seconds were required for the first hundred loops, 20 minutes 30 seconds for the second hundred and 20 minutes for the third.

Handley Page Transatlantic Plane Being Shipped to U. S.

London.—According to a dispatch to the *New York Sun*, the Handley Page firm is packing a plane for shipment to the United States, to attempt the flight across the Atlantic from west to east. The plane is a four motored machine, propelled by four Rolls-Royce motors, totalling 1,500 horsepower and giving a speed of ninety-five miles an hour on a consumption of sixty-two gallons of petrol per hour.

Sweden Plans London to Petrograd Route

Captain Dahlbeck, a Swedish aviation expert, in an article in a Swedish commercial journal, submits a plan for a commercial air route between London and Petrograd. He points out that such a route is practicable by way of Amsterdam, Esbjerg, Copenhagen, Stockholm and Helsingfors. An alternative route through Christiania, Gothenburg and Copenhagen is also suggested for investigation.

Air Lines to Link British Dominions

London, Thursday, February 20.—"Preparations must be made for the day when all-British air routes will play a great part in the maintenance of the commercial existence of the British Empire," said Major-General Sir Frederick H. Sykes, controller general of civil aviation, in an address before members of the Australian and New Zealand Luncheon Club to-day. He said that the British government had for some time been engaged in mapping out stages on an air route from Cairo to Australia, by way of Karachi, Singapore and the Sunda Islands.

"The establishment of postal service by aeroplane is a practical proposition," he said, "and it is one the dominions will undoubtedly have in hand at an early date. Statistics show that for ten years before the war an average of £3,000,000 in gold was anually sent to the United Kingdom by Australia. I leave it to you men of business to estimate the enormous gain that would be secured if this bullion could be transferred and put into circulation in, say, ten days instead of sixty."

Sir Frederic outlined the work that is being done in establishing aerial postal routes between England and France and between Boulogne and Cologne, where British troops are located. At present a letter is five days in transit between London and Cologne, and the speaker declared this time could be reduced to seven hours. He said a regular time table is now being made out, landing stages are being fixed, and detailed preparations for the service are making progress.

British Airship Flies 5,000 Miles

London, February 21.—During a discussion of the Aerial Navigation Bill in the House of Commons to-day, Major Gen. John E. B. Seeley, Parliamentary Under Secretary of the Ministry of Munitions announced that the Government intended to make flying safer by providing a large number of aerodromes, some of them military establishments and some civil.

A British airship, according to Gen. Seeley, recently remained in the air for more than one hundred hours. At an average speed of fifty miles an hour, the Under Secretary added, the airship must have covered more than 5,000 miles. It was possible that the airship could have continued longer in the air, the speaker declared, notwithstanding the fact that it encountered considerable wind.

Four Air Lines Selected by Great Britain for Transatlantic Flight

London.—In connection with the meteorological survey and other preparations for the early crossing of the Atlantic by aeroplane, it has been announced that four routes have been selected for the feat, as follows:

1—From Scotland to Greenland, thence to Canada.

2—From the west of Ireland to St. Johns, where the landing place for the giant seaplane that is to make the flight has been selected.

3—From the west of Ireland direct to New York, when the British fleet makes its intended visit to New York after the signing of the peace treaty, probably in July. The warships will proceed in a long line, with intervals of thirty miles between them, so as to be in position to render every possible assistance to the aeroplane crossing the ocean.

4—By way of Cornwall, Portugal, the Azores and thence direct to New York.

Vedrines to Fly Caudron to Rome

Paris.—Jules Vedrines, who recently landed on the roof of a Parisian Theater, the Galeries La Fayette, announced his intention of flying a twin-engined Caudron on a non-stop journey from Paris to Rome and back. The machine is of the type known as C23, officially, a pattern of night-bomber intended for the entertainment of the Berlin populace during the long mid-winter evenings. The armistice, however, made this unnecessary. The C23 Caudron planes are equipped with two 300 h.p. Hispano-Suiza engines and have sufficient lifting power to carry a twenty-four hour supply of fuel. It is quite possible that Vedrines will succeed in breaking the world's endurance record.

British Lighter-Than Air Anti-Submarine Patrol

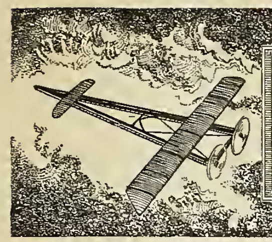
London.—The London *Times* aeronautical review reveals several facts of interest regarding the lighter-than-air patrol against the submarine. A chain of lighter-than-air bases was established on the coast, from Mullion in Cornwall around the coast of England and Scotland to Pembrook. In this patrol and convoy work conducted from these bases, a total of more than 53,554 hours was flown. One of these flights lasted 50 hours and 55 minutes, which record has been bettered by ten hours since the signing of the armistice.

The airships used were of six types: S. Ss. (Submarine Scouts); S. S. Ts. (Imprvoed Submarine Scouts with two motors); Coastals, Coastal Stars, Parsevals and N. Ss. (North Seas).

London to Glasgow Airline

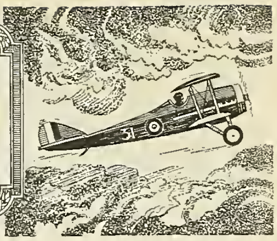
London. — Grahame White has announced that a daily London to Glasgow express air service is being established.

Two F. B. A. Flying Boats ready for flight



ELEMENTARY AERONAUTICS *and* MODEL NOTES

By John F. McMahon



Three Cylinder Motorcycle Driven Machine

As stated last week I am about to describe a light one seater medium fast motorcycle engine machine or at least an improved motorcycle engine with 3 cylinders. Before proceeding I might suggest that readers who contemplate building this machine should subscribe to this paper to insure against missing one or more of these articles which is generally the case when a reader depends on getting one from a local newsdealer.

Hundreds of letters have been received asking for back numbers of Aerial Age containing an article pertaining to the Ford motored aeroplane only to be refused on account of these numbers being exhausted. The reader can send his subscription to the Model Editor who will see that he gets his name placed in time for the first issue containing these series.

The weight of the body of this machine will be about 75 lbs., including gas tank, seat, and control levers, as well as landing gear. The planes including struts and wiring will weigh 65 lbs. Tail works and rudder weigh 20 lbs. which gives a total of 160 lbs. The motor will weigh 125 lbs. complete, giving us a grand total of 285 lbs. for the complete machine.

These weights can be checked up by the reader as we go along. This is not difficult as wood weighs a certain number of pounds per cubic foot according to the species.

Spruce weighs 25 lbs. per cubic foot.
Pine weighs 25 lbs. per cubic foot.
Fir weighs 28 lbs. per cubic foot.
Ash weighs 39 lbs. per cubic foot.

A pound or two can be added to this if the lumber is purchased from an ordinary moulding mill or lumber yard as wood found in these places is generally not as dry as one would find in a big Aeroplane Factory where nothing but the best of materials is purchased.

To calculate the weight of the wings and fuselage is simple and the reader can do this by finding the volume of each strut and longeron or wing beams and ribs, the same as any school boy figures the amount of water that is contained in a vessel of certain dimensions.

The weight of the machine is 285 lbs. empty, for the pilot we will allow 175 lbs., and 5 gallons of gas or roughly 40 lbs. This gives us 500 lbs. approximately for the machine ready for flight.

Now we will use the R.A.F. No. 3 wing section which has a lift coefficient of .00347 at 15°45′.

To find the surface needed we simply use the formula which was given in the early issues of these articles which is

$$\text{Area} = \frac{500}{.00347 \times 1225} = 117 \text{ sq. ft. of surface needed at}$$

35 M.P.H. This you will understand is for a monoplane wing having no interference. Biplane interference varies according to the gap to chord ratio which for the combination we are going to use gives us an efficiency of 85 per cent.

As we need 117 sq. ft. of monoplane surface it will be necessary for us to increase the Biplane surface until the lift equals that of a monoplane of 117 sq. ft. We find this by dividing 117 by .85 which gives us 137.5 sq. ft. needed. At 4 degrees the coefficient is .00175.

The machine which I am about to describe will have dimensions as follows:

Top Wing	20 feet
Lower Wing	16 feet
Chord	4 feet
Gap	4 ft. 3 in.
Overall length	15 feet

There will be a single set of struts on each side and the top wing will have an overhang of 2 feet. The planes will have a stagger of 12″. Ailerons on top wing only.

Model Aeroplane Contest in California

That the Western boys are beginning to catch up with the boys of the East is shown in an account of flights performed by rubber driven models in a contest for a Silver Cup held by the San Francisco Model Aero Club, under the auspices of the Pacific Aero Club who are to adopt the smaller organization as an auxiliary. Mr. Sydney Bibero represented the Pacific Aero Club, of which he is secretary. The judges were Messrs. W. F. Hopkins, George Ashley and Clion Calwary.

Those who competed were the following:

Roy Ashley
Lawrence Irwin
Daniel Tuthill
Theodore Morse
George Ashley
Preston Hopkins
George Mullins
Laurence Pinkham
Earl Vival
Clion Calwary
John Gutman
Edward Mosone
Raymond Hasen
Jack Fairfield

Many members did not compete owing to the rainy weather. The contest was won by Edward Mosone. Record of flights will be printed later. Mr. W. F. Hopkins is the Director of the Club, and Raymond Larsen is President.

The rules for the contest were as follows:

1. Model must be manufactured by member entering same.
2. Each member must abide by the rules and regulations and decision of the judges.
3. Models must be flown by members entering same.
4. All entries must be registered before the flight: name of exhibitor, type of model, and weight.
5. Each entry is entitled to three trials and three official flights.
6. Announcement must be made to judges before each official flight is flown. Official flights must not be flown before word from the judges.
7. Each entry is allowed two assistants.
8. No flight is conceded official unless the model flies 100 feet.
9. Flights will be measured in a straight course, regardless of curves, dips and circles.
10. Judges may change regulations at their pleasure.
11. The average feet flown declares the point. The winner of the contest is declared one point toward the cup.

The San Francisco Model Aero Club holds contest for a cup. Mr. R. Hansen is fourth from left standing

Aeronitis is a pleasant, a decidedly infectious ailment, which makes its victims "flighty," mentally and physically. At times it has a pathologic, at times merely a psychologic foundation. It already has affected thousands; it will get the rest of the world in time. Its symptoms vary in each case and each victim has a different story to tell. When you finish this column YOU may be infected, and may have a story all of your own. If so, your contribution will be welcomed by your fellow AERONUTS. Initials of contributor will be printed when requested.

The Soliloquy of a Modern Hamlet

To fly, or not to fly—that is the question.
'Tis not befitting that we stand aloof—and
In the aerial fields we pioneered—see
Other nations plunged in contest keen
To wrest the laurels of the skies
That, once, were ours,—to be but cast aside
As trifling baubles nothing worth.
Much better that we gird ourselves anew
And, in the lists, compete for what is but our own
By right of heritage, and in accord
With hist'ry's records of ambitions won and held
In every sphere where skill of men count aught
And Progress holds its sway.

One fain would ask how 'twas we failed
To heed the deeds and pleas of those, our pioneers,
Wrights, Curtiss, Martin,—others who saw,
Writ large on backgrounds of celestial blue,
The warning prophecies of coming days.
Yet we lay dormant. Men of other lands
Foresaw the uses of the bird-like thing
Conceived and born beneath our flag
But fostered 'cross the seas, while we
Inert, supine with smug contemptuous mien
Cared nothing for our passing fancy's child.

So came grim Mars—in tragic, fearsome garb of modern cut
And tailored by the hand of science in callous style,
And brave men fought on land and 'neath and on the sea, and—
As if in irony to mock us—
High in the clouds where we have staked our claims,
And quit them as if 'twere barren soil
And yielding naught but Death to trespassers.

Two years,—And then the call to Freedom's standard
Rang throughout our land, and Freedom's sons responded
As in other days. Each to his bent—on sea or in the trench—
And many sought adventure in the skies
Beside their fellows—gallant Lafayettes who'd scorned
The niceties of warring etiquette—
And played their parts
The men were ours, but not the craft they flew
That helped their winning—thus they won
With Yankee grit plus skill of European design
And we would fain have had that winning all-American.
And so we paid the price of indolence that left a blot
'Pon 'scutcheon bright that ne'er before
Was tarnished by so gross a fault 'gainst our traditions.

Thrice-blessed Peace, wrought by our help
(As Saladin's Crusaders of the long-gone times)—
And with intent to prove our might in other fields
Than those of skill and wit and money-getting—
Spread out her wings and a war-tired world
Set to the task of counting up the cost
And make best use of lessons learned,—and found
That fashioning of plowshares from swords a-rust
Has counterpart in aerial craft of war
For needs of Peace in varied form and use.

Where rests the fault that we—who should be first—
Are still alacking (in most grievous shape) that
Enterprise that needs must be applied
To gain the mastership in such directions
And so compete with those who headway made
By reason of our own short-sighted ken
And yet make headway while we—again—
Withhold the aid from those who strain at leash
To join the friendly fray of import grave?

Blame not the Press—that ever-ready friend
Of Progress in whatever guise assumed—
Nor yet our youth, well-learned in art of flight,
Awaiting but a chance to prove their worth
In fields of Commerce—as was proved in War—
On aerial highways knowing neither bounds nor fence.
Blame not our craftsmen, keen to test their skill
Against all comers in design and build
To factor conquest of the elements aloft.
And—still again—there rests no blame with those
Whose workshops idle lie and wait that wide demand
Accorded luckier rivals o'er the seas.

Where then lies the fault?,—ah, there's the rub.
To end this talk of good intent and high ambition
And let the skies bespeak that laggardness has ceased
Would be—indeed—becoming more our prestige won by deeds.
And held by greater deeds.
Much better that we know and talk cold truth,
And face the fact that contest must decide
Where—from the race-tracks of the Heavens—there comes
The shout,—"They're off!—and Europe holds the fields"
And we talk on, of trans-Atlantic flight and Polar quest,
(Great ambitions,—but scarcely all that's to 't)
And Aerial Mails,—that needs must wait awhile, forsooth,
While Europe with her far-flung sky routes laid
O'er wide dominions, linking distant colonies and sons
With Mother-lands,—and with but little said in boast.

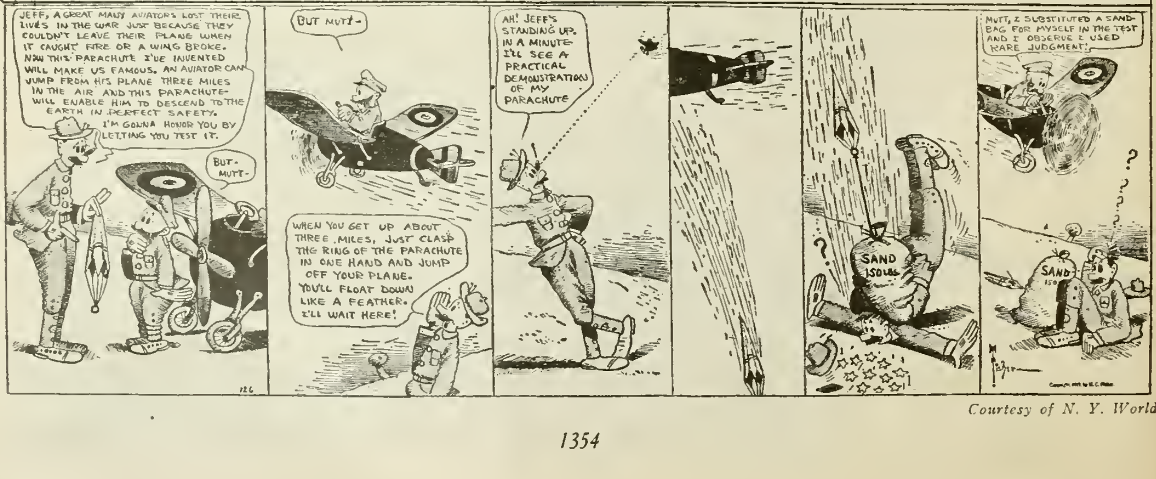
And Europe knows—and steels herself to meet—
Our grim determinings, when aroused,
In making war or tilting in the lists of Peace
And that, eventually—
Eventually!—out upon the word—
Why not NOW?

Harry E. Tudor, in the Brooklyn *Daily Eagle.*

(Dedicated to those, who—with heart and mind and hand—are ready to make full amends for a fault not theirs.)

MUTT AND JEFF—Mutt Isn't in Tom Edison's Class . . . . By BUD FISHER

(Copyright, 1919, by H. C. Fisher. Trade Mark Reg. U. S. Pat. Off.)


JEFF, A GREAT MANY AVIATORS LOST THEIR LIVES IN THE WAR JUST BECAUSE THEY COULDN'T LEAVE THEIR PLANE WHEN IT CAUGHT FIRE OR A WING BROKE. NOW THIS PARACHUTE I'VE INVENTED WILL MAKE US FAMOUS. AN AVIATOR CAN JUMP FROM HIS PLANE THREE MILES IN THE AIR AND THIS PARACHUTE WILL ENABLE HIM TO DESCEND TO THE EARTH IN PERFECT SAFETY. I'M GONNA HONOR YOU BY LETTING YOU TEST IT.
BUT-MUTT-
BUT MUTT-
WHEN YOU GET UP ABOUT THREE MILES, JUST CLASP THE RING OF THE PARACHUTE IN ONE HAND AND JUMP OFF YOUR PLANE. YOU'LL FLOAT DOWN LIKE A FEATHER. I'LL WAIT HERE!
AH! JEFF'S STANDING UP. IN A MINUTE I'LL SEE A PRACTICAL DEMONSTRATION OF MY PARACHUTE
SAND 150 LBS.
?
MUTT, I SUBSTITUTED A SANDBAG FOR MYSELF IN THE TEST AND I OBSERVE I USED RARE JUDGMENT!
SAND 150
? ? ? ?

Courtesy of N. Y. World

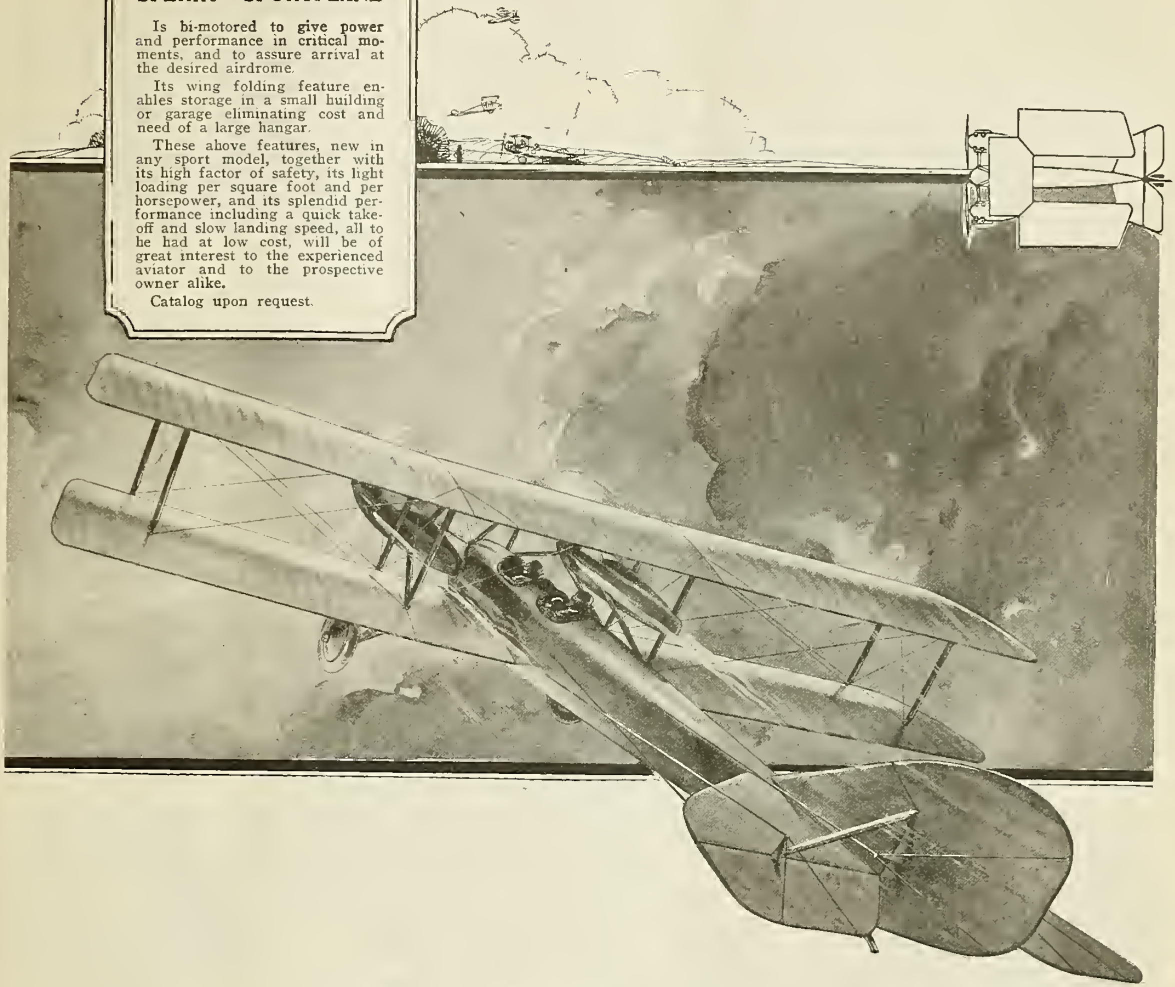
THE
SPERRY SPORTPLANE

Is bi-motored to give power and performance in critical moments, and to assure arrival at the desired airdrome.

Its wing folding feature enables storage in a small building or garage eliminating cost and need of a large hangar.

These above features, new in any sport model, together with its high factor of safety, its light loading per square foot and per horsepower, and its splendid performance including a quick take-off and slow landing speed, all to be had at low cost, will be of great interest to the experienced aviator and to the prospective owner alike.

Catalog upon request.



The W. B. B. Aeromotor

WE are ready to fill single or quantity orders for this remarkable little motor which is the product of investigation and development thruout the war.

It is a four cylinder, V type, air-cooled 129¾ pound motor developing 38 horsepower.

Besides our exhibit at the Aero Show, we will demonstrate, by appointment at a place convenient to the Show, its simplicity of installation and upkeep and its reliability of operation.

LAWRENCE SPERRY
President
THEODORE ARTER
General Manager

THE LAWRENCE SPERRY AIRCRAFT COMPANY.

FARMINGDALE, LONG ISLAND

plane and balloon fabric on Government specification, and which contributed a good proportion of the national output, had on exhibit a complete fabric-testing laboratory. One machine automatically performed and recorded tensile strength tests of fabrics while another machine made bursting tests, which were automatically recorded by the device.

This company has brought out a cotton fabric for use on aircraft which is superior to linen in that it has the same stretching characteristics as possessed by dope, thus preventing peeling and cracking. This material, known as Warwick Seamless Aero Cord, has 35 to 40 per cent. less stretch than linen, although it weighs no more than 3-ounce linen fabric. It is built up on the same principle as the automobile cord tire. A heavier weight—5.75 ounces—of this fabric withstands a bursting test of 50 pounds and possesses 300 to 400 per cent. greater strength than the cotton fabric which was first developed as a substitute for linen.

WYMAN-GORDON COMPANY

(*Garden, Space* 320-321)

The Wyman-Gordon Company are exhibiting their extensive line of crankshafts, which have been used on Liberty motors, Rolls Royce, Curtiss and Alberto motors, manufactured by the Fiat Company, also on the British B. H. P. and numerous others. The product of this company is well known to the industry and their extensive manufacturing experience and production facilities has enabled them to render exceptional service in supply of materials for the war program.

The Zenith Exhibit

The Zenith Carburetor Company, who, with their French, English, Italian and American factories, supplied a large majority of the carburetor equipment for the Allied Air Forces, will have an exceedingly interesting and instructive exhibit in space Nos. 101, 102 and 103, on the elevated platform at Madison Square Garden during the Aeronautical Exposition.

The Zenith Company supplied all the carburetor equipment for Liberty engines and their product was also used on such other engines as Hispano Suiza, Curtiss, Renault, Lorraine-Deitrich, Salmson, Anzani, etc. Their carburetor exhibit will consist of the following models:

US52, used on Liberty 12-cylinder aircraft engines.

US52 in section, exposing the jets, fuel and air passages, etc., so that its principle of operation may be easily explained and grasped.

US52, cut away so that the action of the altitude correcting device can be clearly seen.

48DC (French design, but American built), used on 150 H.P. Hispano Suiza.

58DC (French built), used on 220 H.P. and 300 H.P. Hispano Suiza.

65TE (French built), used on Salmson Radial engine.

55GD. This is the latest development in Zenith aeronautical carburetors, it having been approved and accepted after careful and thorough tests for the 8-cylinder Liberty engine. It was later to have replaced the US52 on the 12-cylinder engine. The signing of the armistice stopped all work on this and it was never actually put into production, although quite a few were manufactured to be used on the 8-cylinder engines completed.

L8A, used on Hall Scott 4-cylinder engine, and now used on Union Gas Engine Company's aeronautical engine.

06DS, used on Curtiss OX and OXX engines.

06DS. Sectional model showing all parts and operation.

The Zenith Company also have a very interesting and instructive booklet descriptive of the Liberty engine and of the Liberty engine carburetor. The operation of the carburetor is carefully and clearly explained, some data on the Liberty engine is set forth, and there are some very interesting photographs. These pictures include views of the carburetor, of the Liberty engine, of the first plane in which a Liberty engine was mounted, an L. W. F. specially built for the purpose, the testing outfit used on Pike's Peak, etc. These will be had on request at the exposition.

Zenith Carburetor Company representatives at the exposition: V. R. Heftler, president and general manager; V. I. Shobe, assistant general manager; L. A. Pratt, advertising manager; R. H. Taylor, New York branch manager; C. C. Sands, road engineer.

Specialized Wood-working Machinery Unnecessary for Making Aircraft Parts

It is the general opinion that large investment in new machinery is required if a joinery or cabinet work plant is to turn to making small aircraft parts. While highly specialized machinery for making finished parts have been designed and are of great value in quantity production, the equipment of a small wood-working factory is frequently sufficient to produce profitably such parts as wing beams, ailerons, struts, elevators, and landing gear parts.

A British contemporary publication lists the essential machinery for the production of such parts as follows:

Circular saw
Surface planer }
Thicknesser } May be a combined machine.
Band saw
Jig saw
Two double spindles
One single spindle
Dimension saw
Drilling machine.

There may not appear sufficient machines above, but it is quite practical to recess or box spars on a single spindle. Although it may appear a delicate undertaking, the article produced is smooth enough to be left without further cleaning up, apart from papering the stop of the cut.

Also struts may be spindled in a box or jig very simply constructed and do not take longer to clean up and finish than those made on a copying lathe or strut-former.

The manufacture of propellers has proved very profitable to some sub-contractors, and only requires machinery available in almost any wood-working mill. In addition to the machinery listed below, if four blade propellers are to be produced a tennoning machine is required for half lapping.

Band saw
Surface planer
Thicknesser
Double spindle
Light drilling machine for pilot hole
Heavy drilling machine for hub and bolt holes.

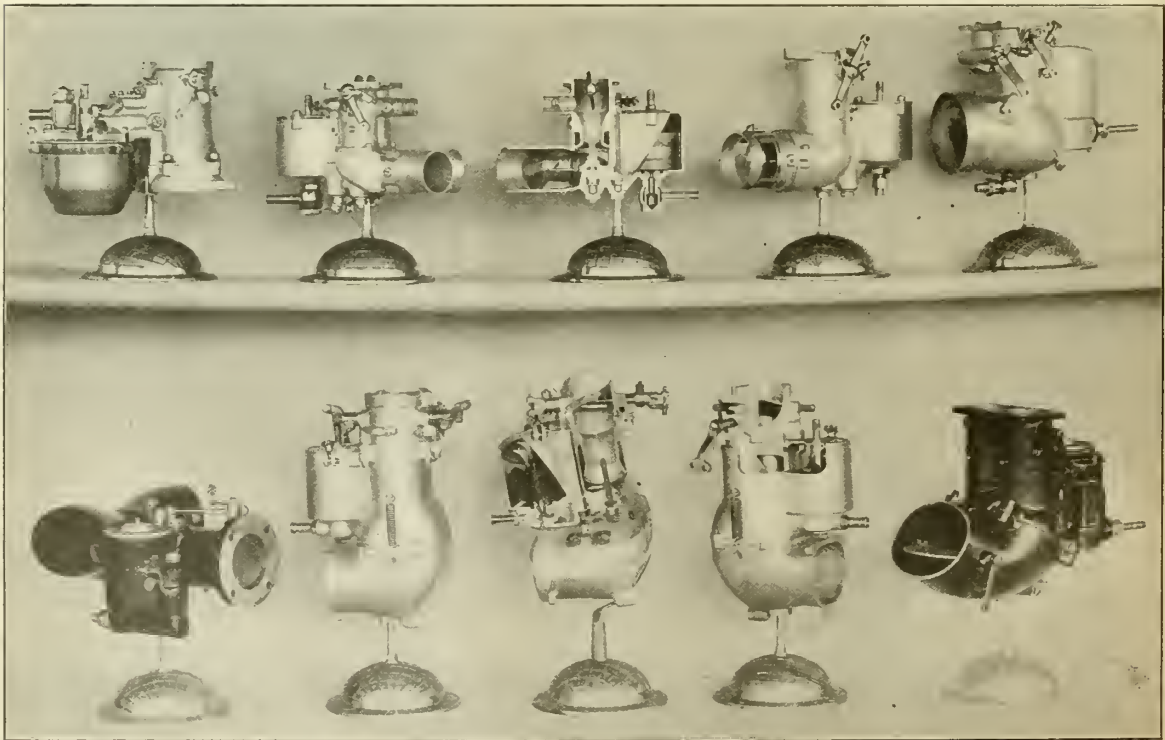
A good deal of shaping with only the above equipment is necessary, but only where there is production in considerable quantities is any material saving effected by recessing machines and the like, as the original investment required is large.

It has been frequently demonstrated that greater attention to the salvage of waste material is sufficient to make profitable the employment of a good man with the sole duty of watching and advising on the conversion of timber during its passage through the saw mill.

Weather Does Not Affect Liberty Motor

Captain J. L. Robinson, who flew from Detroit to Ellington Field, Houston, Texas, in a De Haviland Four plane equipped with a Liberty motor, is quoted as stating that the Liberty motor operates as efficiently in zero weather as in summer weather.

Captain Robison, accompanied by Lieutenant A. A. Adams, is making cross country flights to make technical observations of the Liberty motor under winter flying conditions. On January 3rd to 4th they made a flight from St. Louis to Indianapolis to Detroit, and although the weather was below zero it was merely necessary to renew gas and oil to make the plane ready for the long southward flight.



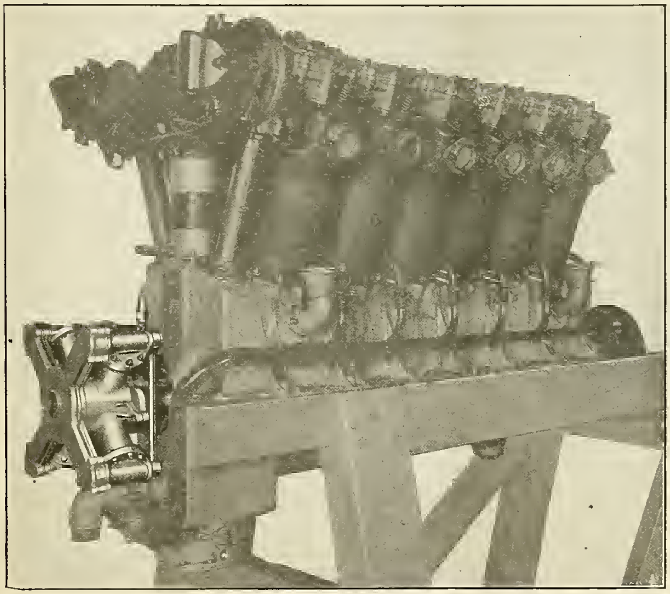
Section views of various Zenith models

SEE IT AT THE AERO SHOW

(Madison Square Garden)

Liberty Starter

Approved and Now Being Made For U. S. Naval Hydroplanes



Weight, 49 pounds complete.
Cranks motors up to 500 horsepower.
The device itself weighs but 30 pounds.
It is entirely self-contained without brackets or other gearing, bolting direct to crankcase of engine, and cranking direct to end of crankshaft.

A small air cylinder, 1¼" x ¾" with piston running continuously for air pressure on gasoline feed tank is combined with the device and entirely independent in action. This starter furnished with or without it at option.

Official Tests All Satisfactory

CURTISS AIRPLANE CORPORATION
April 20-22, 1916

HALL-SCOTT MOTOR COMPANY
Dec. 6-7, 1916

WASHINGTON NAVY YARD
Aeroengine Testing Lab.
Oct. 23-24, 1917

LANGLEY FIELD
May 15, 1918

Information regarding these trials given on request.

THE simplicity and reliability of the Liberty Starter for Airplanes are due to the fact that compressed air, the most reliable and easily controlled motive force known, is the actuating energy.

Where chances of starter trouble cannot be taken, as, for instance, on naval seaplanes, this type of starter is equipped. Liberty Starters have been thoroughly tested by the U. S. Navy, and are used on U. S. Naval Planes. (See list of tests made.)

The Liberty Starter is an air motor for starting, and a compressor to store air for its own energy in starting. It is entirely self-contained; couple direct to end of crankshaft of motor; needs no alteration in motor or gear reduction, and has ample power for magneto starting. It is the *one* efficient, *dependable* type of starter for airplanes to-day.

We welcome comparative tests, and will gladly arrange for any kind of trial for the Liberty Starter.

Specifications on Request

MOTOR COMPRESSOR COMPANY
52-60 Dickerson Street Newark, N. J.

STREAMLINE WIRE VS. CABLE

THE superiority of streamline wire over cables for the rigging of aeroplanes is shown in some interesting comparative flying tests made at McCook Field, Dayton, Ohio, on November 15 and 25.

A De Haviland 4 plane was equipped with streamline wire and its performance compared with a similar machine having cable.

The results are as follows:

	—With Cables—		—With Streamline—	
Altitude (feet)	Speed M.P.H.	Engine R.P.M.	Speed M.P.H.	Engine R.P.M.
5,000	122.0	1,700	126.0	1,680
6,500	121.0	1,670	125.5	1,670
10,000	118.5	1,620	124.0	1,620
13,000	115.0	1,570	122.0	1,680
15,000	110.5	1,540	119.0	1,540

Speed with cable at 15,000 ft. is low.

Average increase in speed attained is 5.5 M.P.H.

With reference to mention of increase speed attained of 5.5 miles per hour, this is an increase over the use of cables covered with rubber streamline, which in themselves increased the speed about 8 miles per hour, making a total increase through the use of Hartshorn streamline of about 15 miles per hour.

A detailed report of the flight test has been made by Mr. A. J. P. Bertschy, A.M.E., of the Airplane Engineering Division, by direction of the Director of Production, B.A.P.

The report dated November 15, 1918, telling of the test flight of a De Haviland 4 plane equipped with streamline wires, is as follows:

"At 11.34 A. M. to-day, DH-4 Ship P31 Serial No. 32086 took off McCook Field in charge of Pilot Hambly with Lt. McCoy as observer for the purpose of testing streamline wires made by the Stewart Hartshorn Company.

"This ship was equipped at McCook Field with wires and fittings in order to check wire lengths, strap ends made by the Stewart Hartshorn Company and strainer plates made by the Dayton-Wright Airplane Company. The assembly consisted of double streamline flying wires and single streamline landing, drift, interplane and tail unit brace wires. All of the measurements check correctly with blueprints and the assembly was completed without trouble. Dihedral, incidence and stagger angles were according to specifications.

"The first 5,000 feet elevation was obtained in 3 minutes 40 seconds; highest altitude reached, 16,000 feet. The ship landed again on the field at 12.12 P. M., having been in flight approximately 40 minutes. Upon landing, all wires and fittings were found to check up correctly with all measurements taken before the take-off.

"Pilot and observer report: Noticeable increase in climbing and flying speed, as will be noted in reports when curves from indicators are plotted and computed. The air speed indicators used have been chcked with the ground course; no speed test was made to-day on account of unfavorable conditions. The temperature recorded at highest altitude was 24 degrees above zero.

"This ship has been previously equipped with double cables which were streamline and an increase in speed of 8 miles per hour recorded. It is thought that with the streamline wire equipment a speed of from 10 to 12 miles will be recorded. The wires used were made by the cold reverse rolling method according to specifications drawn up by me covering wires for experimental purposes only and all wires made by this method should be accepted because they are superior to wires made by the old specifications. Further data and tests are attached.

"Mr. J. M. Layngm, representing the Stewart Hartshorn Company, and Mr. W. H. Radtke, metallurgist from the Pittsburgh Laboratories, who has been assisting me in the manufacture of streamline wires for test purposes, witnessed the applications of the wires, fittings and strap ends, and the final test of these parts in assembly, by flying as above reported.

"It should be stated here that all wires manufactured by the Stewart Hartshorn Company of East Newark, N. J., are of the same quality of those used to-day in the test flight, and I consider them superior to any wires made by any other process and very much superior to wires made in England. By reference to reports which are attached hereto, a noticeable improvement in all qualities in streamline wires made by the cold reverse rolling method will be noted."

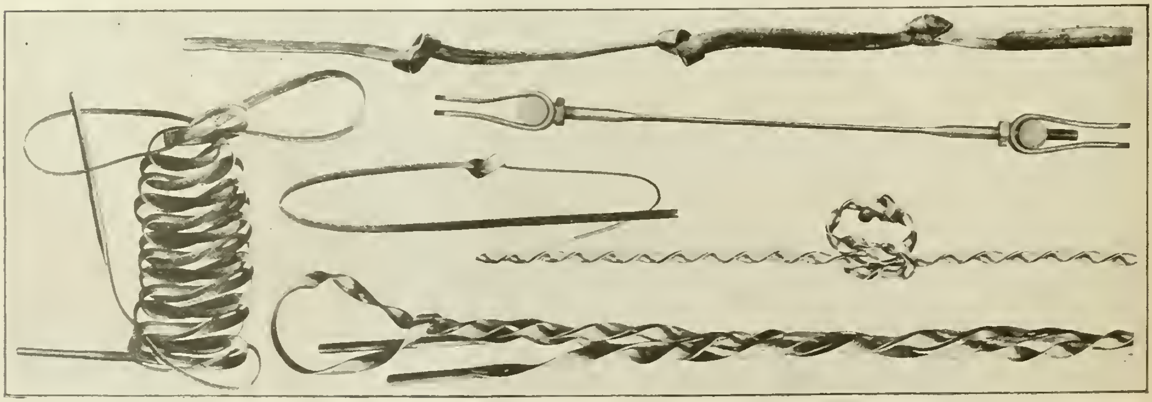
Physical tests upon universal strap ends for the De Haviland 4 were recorded in a report dated August 29, 1918, submitted by Mr. J. S. MacGregor, A.E., of the Testing Department, Production Engineering Department, Washington.

The strap ends were made of B. H. P. Steel No. 2330. They were furnished to the laboratory assembled with streamline wires with the request that they be tested in tension assembled.

These tests were made by gripping the wire in the wedge of the machine and using pin connections on the straps. The failure occurred in every case in the streamline wire. The results are recorded below. An attempt was then made to break the strap ends without the use of the wires; pin connections, however, were used. Considerable difficulty was experienced in breaking these straps, but a fair test was obtained upon two, the results of which are shown in the tabulation. It will be noted that the strap ends have over twice the capacity of the streamline wires which are furnished with them.

Table of Results.

Laboratory Number	4835	4836	4837	4838	4839	4840	4841	4842	4843	4844
Specimen marked	1	2	3	4	5	6	7	8	9	10
Width, Original Ins., Major Axis	.357	.357	.356	.354	.353	.355	.351	.353	.356	.358
Thickness, Original Ins., Minor Axis	.088	.088	.089	.092	.092	.092	.092	.092	.090	.094
Maximum Load, lbs., wire	4120	3840	3835	3860	3870	4050	3930	3920	3885	3990
Strap	—	9830	11000	—	—	—	—	—	—	—



Some interesting bending tests of the Stewart Hartshorn Streamline Cable

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(Continued from page 1349

the large end of the rod, acting directly on the bronze back of the Babbitt lined main bearing.

The small end was held by means of a floating clamp that was securely locked when the small reamer, passed through the guides in the fixture, located the up and down position.

A Standard Martell Reamer was used on both ends, the whole operation taking only a few minutes.

The large end of the "Blade" rod was ground to size, the steel rod bearing directly on the outer surface of the Babbitt lined bearing of the "forked" rod.

As shown in the figure, this fixture was for reaming the small end only. The large end was located and held by means of an expanding bushing and tapered plug, located in bushed holes in the fixture.

The call for accuracy stimulated by the production of aircraft motors is extending all along the line. The practice of before-the-war methods is rapidly becoming obsolete in many instances, and the well known accuracy and speed of the Martell Reaming System should call for many installations in the motor field, not only for aviation motors, but passenger car, truck, tractor and marine motors as well.

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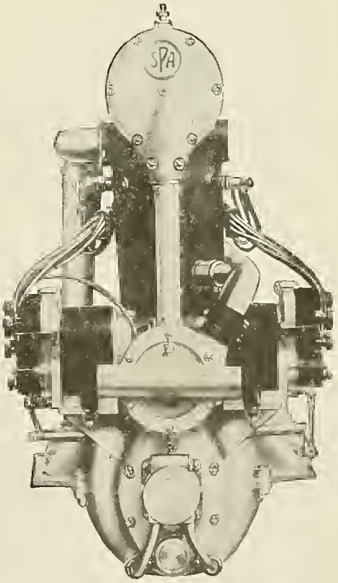

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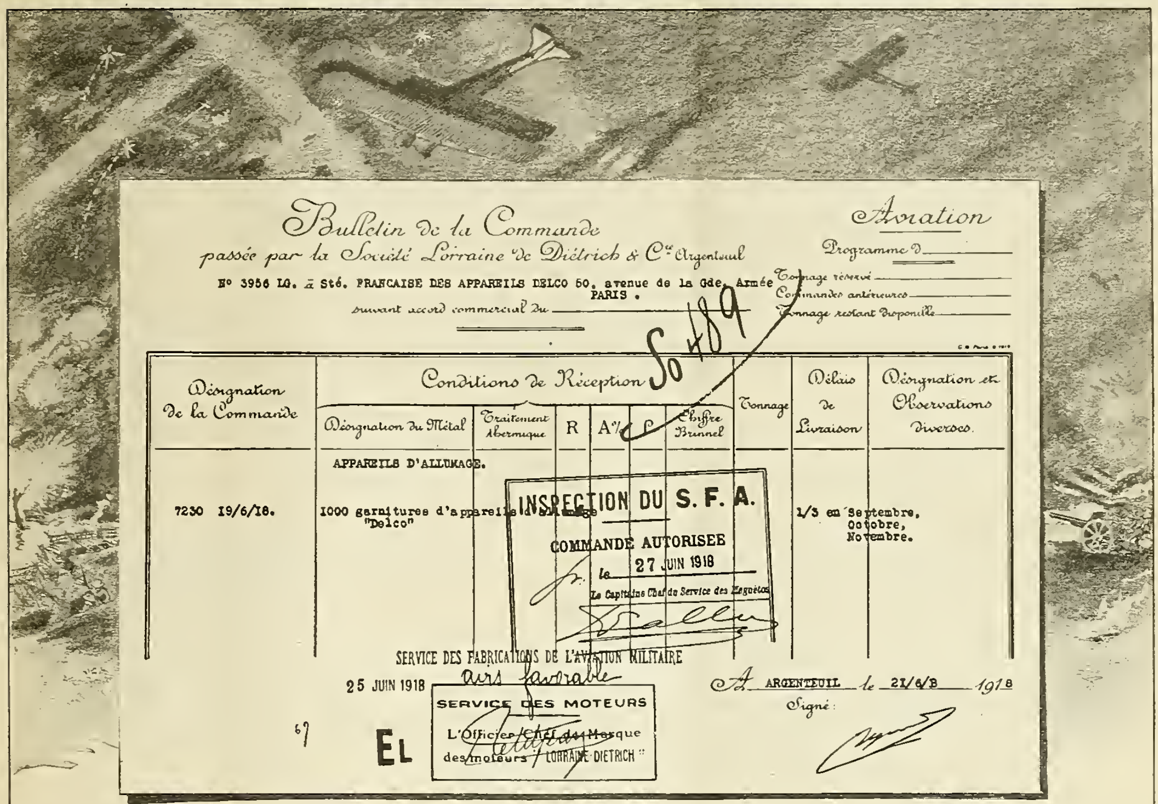

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des moteurs "LORRAINE DIETRICH"

67

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Signé:

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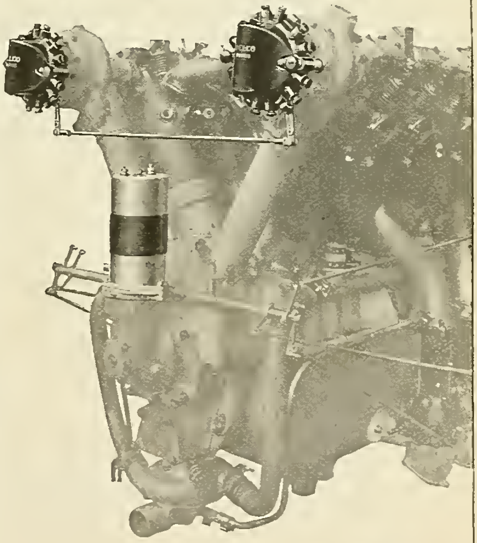
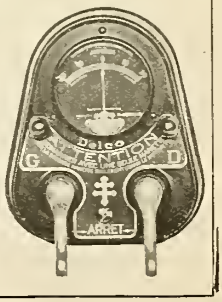


Above: Delco installation on Lorraine-Dietrich motor.

Right: Delco switch used with this type of ignition.



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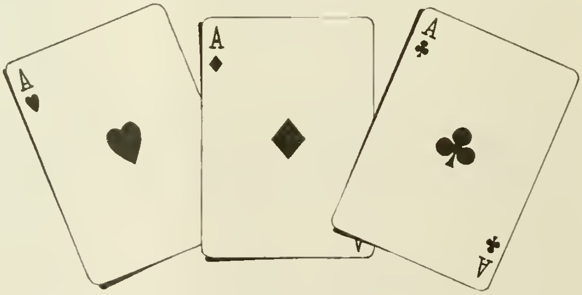

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(*Continued from page* 1336)

ciples of aeronautical engineering in a machine which would be scientifically correct as well as practically fitted for its function and duties. The aim of the designers was to produce a plane combining the qualities of the two types of machines then in use. On the one hand, there was the pursuit plane, with its rotary engine, having remarkable flexibility, speed and climb, but having short range of action, due to limited fuel carrying capacity, and being more or less unreliable because of the type of engine used and its light construction. For the time, the rotary motor had attained its limit in power and performance; efforts to increase its size and power and the number of cylinders were unsuccessful.

On the other hand, the reconnaissance and day bombing machines were somewhat cumbersome and considerably inferior in speed and climb, the advantage of their greater power being largely offset by increased fuel consumption and the larger size and weight of the machine itself.

Power Plant

The S. V. A. was therefore built to use a newly developed light and highly efficient stationary engine; the 200 h.p. 6-cylinder S. P. A., the superior of any rotary engine in power, reliability and low fuel consumption, without being considerably heavier. As a matter of fact, the S.P.A. is actually lighter, if the total of engine plus fuel for several hours flight is considered.

The compactness of the 6-cylinder type permitted a very small front area, and limited the head resistance.

Details of Construction

The wind resistance of the fuselage was made the subject of exhaustive wind tunnel tests, resulting in the peculiar triangular section of the tail gradually connected to the rectangular body. This possesses high aerodynamical efficiency and permits very rigid construction. The wooden frame and plywood panels are very strong and rigid and designed to allow no warping.

The system of trussing is novel and very successful. Instead of the usual system of struts and cables, involving considerable head resistance and requiring frequent adjustment and "tuning," a rigid system of stream-lined steel tubes was introduced, which makes the whole wing rigid under all conditions and assembly and disassembly very simple.

The wings are covered with a special silk "Ansine," manufactured for aeronautical purposes and doped by a special process.

The Landing Gear

The landing gear consists of a very simple and strong system of steel tubes. The horizontal member connecting the two sides and containing the axle is made of pressed sheet steel in a stream-lined frame having very light weight and low head resistance. A special tail-skid made of steel spring insures efficient braking effect in long landings. The machine is very sturdy and has a factor of safety larger than eight in all parts; and stands hard usage satisfactorily with very little attention.

It is armed with two fixed machine guns firing through the propeller with mechanical synchronizer.

Specifications of the S. V. A.

The specifications of the S.V.A. are as follows:

Wing spread	29′ 10″
Overall length	26′ 7″
Overall height	10′ 6″
Lifting surface	261 sq. ft.
Weight, empty (including 66 lbs. of water),	1510 lbs.
Motor: S. P. A.—Ansaldo—	190 h.p. at 1500 R.P.M.
	210 h.p. at 1600 R.P.M.
	225 h.p. at 1700 R.P.M.
Gasoline consumption—	16 gallons per hour at 1500 R.P.M.
	17.5 gallons per hour at 1600 R.P.M.
Oil consumption	6 lbs. per hour

The total fuel consumption is therefore about 100 lbs. per hour at full speed.

Useful Load: (a) Reconnaissance—500 lbs., distributed as follows:

Pilot and instruments	180 lbs.
Guns and ammunition	90 lbs.
Gasoline (2 hours on wide open throttle: about 3 cruising)	200 lbs.
Oil	30 lbs.
Total	500 lbs.

(b) Bombing—920 lbs. distributed as follows:

Pilot and instruments	180 lbs.
Guns and ammunition	90 lbs.
Gasoline (4½ hours wide open, about 6 cruising)	450 lbs.
Oil	35 lbs.
Bombs (3 bombs of 6" .38 diameter)	165 lbs.
Total	920 lbs.

(c) In many instances and for special purposes the S. V. A. has been safely loaded up to 1,100 lbs. of useful load.

Performance:

Speed at sea-level	136 m.p.h.
Speed at 3,000 ft.	133 m.p.h.
Minimum speed	45 m.p.h.
Climb (with 500 lbs. load)	10,000 ft. in 10 minutes
	20,000 ft. in 28 minutes

The War Service of the S. V. A.

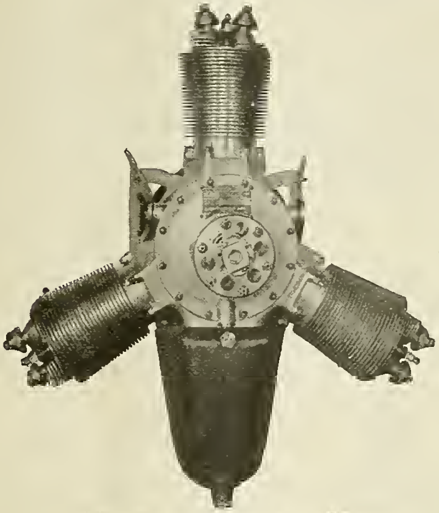
That the designers of the S. V. A. were right in their theories was apparent when the results of the static tests came within a few thousandths of an inch from the calculated; when at the first trial flights Sergeant Stoppani, the pilot, emphatically declared that no aeroplane could have better balance and manœuvring ability. It was confirmed in experimental flights and bombing trips; such as the raid, Turin-Udine-Turin, 700 miles in 5 hours by Pilot Stoppani; the raid, Malpeusa-Foggie-Bologna, 900 miles in 6 hours 50 minutes by Major Lombardo and many others.

At the front, the S. V. A. was received with enthusiasm by the pilots who found in it a machine adapted to daring expeditions over the enemy's country. The S. V. A. became the master of the Italian sky, equally dreaded by the enemy's pilots, who feared its two machine guns, and by the enemy's infantrymen, who soon knew its bombs and bullets. The remotest emplacements and works of the enemy were detected and photographed by the S. V. A.'s. Swift patrols observed the Austrian fortresses in preparation for great bombing expeditions over Pola, Cattaro, Fieume, and other cities, and returned escorting the heavy bombers, after releasing their own cargoes of high explosives. A squadron of three machines headed by Captain Polli crossed the Alps and bombed the station of Innsbrück. Another flew from the Italian front to the nest of German Zeppelins, Friedrichshafen, on the lake of Constance, and returned unharmed. Captain Polli, alone, hunting for an Austrian dirigible, crossed the Adriatic, flew all over Albania, Montenegro, Dalmatia, and returned by Trieste—about 50 miles, half of which was over the sea.

Finally, the most impressive aviation exploit of the war—the flight over Vienna. A whole squadron of 7 machines, commanded by Major Gabriele d'Annunzio, who flew a two-seater S. V. A., left the Italian front, crossed the Alps despite a storm, passed over the mountains and forests of Central Austria, reached the enemy's capital unmolested in compact formation. To the great surprise of the enemy, the Italian planes circled lower and lower over the city, took photographs at surprisingly low altitudes, dropped thousands of three colored leaflets illustrating German lies and spreading seeds of revolt. It is stated that the young Emperor Charles himself watched with fearing eyes the unprecedented and unexpected spectacle from his imperial mansion. The total distance was over 700 miles and the flight lasted about 5½ hours.

The S. V. A. Seaplane

In the meantime the S. V. A. had been modified in various forms: first, a hydroaeroplane, in



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which pontoons take the place of the landing gear, the machine remaining unchanged in all other respects; second, a two-seater for reconnaissance and fighting.

The S. V. A. Pursuit Plane

As a result of the comment of pilots at the front, the constructors became convinced that the S. V. A. was essentially a long-distance craft adapted to endurance and speed, but it was not designed for the extreme rapidity of climb and flexibility of manœuvring required of the pursuit plane, which must be ready at all altitudes for instant combat at the first sight of an approaching enemy.

The wonderful results attained by the combination of the S. P. A. engine and the S. V. A. machine encouraged the builder to study a new type in which the successful qualities of the S. V. A. could be preserved, but the size and weight reduced, the carrying capacity limited to the fuel necessary for 2½ hours' flight, with a corresponding increase in flexibility, climb and speed. The problem was not easy, but after careful experimenting the "Ansaldo I," or "Balilla," was produced.

In this machine the wing spread is reduced and the upper wings are of same size as the lower. The motor and the pilot have been brought nearer to the center of gravity and the tail shortened, reducing the moment of inertia. With the smaller wing spread, sufficient trussing is obtained with but two struts on each side, braced by diagonal cables. A special device permits dropping the gasoline tank by pulling a lever should it be set afire in combat. The motor is then fed by gravity tank.

Specifications of the Balilla

The specifications of the Balilla are:

Wing spread	25′
Overall length	21′ 8″
Overall height	10′ 6″
Motor: Same as for S. V. A.	
Useful load (with 2 hours fuel wide open or 3 cruising)	500 lbs.
Speed	140 m.p.h.
Climb	16,000 ft. in 16 minutes

This machine had not been very long at the front before the enemy's collapse; but the results were very satisfactory, as many Austrian planes shot down by it testify.

Commercial Aspects

With the end of the war, the problems of civilian aviation comes to the front.

In this field, the S. V. A. deserves special attention, being amongst the military planes nearest and most adapted to transformation to the uses of peace. We have seen that it has been built since its inception as a long-distance plane. The greatest reliability of the engine and the plane was therefore the first consideration of the builders, and without it the machine could not have given any satisfactory service in war, where a forced landing while flying over enemy territory would have meant its complete loss.

Speed, long range and fuel economy are its main qualities. The power, while being low enough to avoid useless costs, is high enough to insure high speed, and, above all, a large reserve of power, making the handling of the plane easy and safe even through bad weather. The minimum landing speed is especially slow, and the handiness and strength of the machine reduces the damage in case of forced landing on unfavorable ground to a minimum. The operation of the machine is very economical, due to its small size, easy sheltering and handling on the ground.

In Italy it has been adopted as mail-carrier on several lines throughout the country. With the progressive spread of civilian aviation, which, though perhaps slow, cannot fail, the S. V. A. is ready to become the aerial roadster for the enterprising sportsman, in the single or two-seater types and the standard type of mailplane for the postal authorities.

Cited for Bravery

First Lieut Herbert B Bartholf, pilot, Air Service, 103d Aero Pursuit Squadron. For extraordinary heroism in action near Aincreville, France, October 3, 1918, and near Baalon, France, November 4, 1918. On October 30, in the region of Aincreville, Lieut. Bartholf, with one other pilot, engaged five enemy planes. Outnumbered, he did not hesitate to attack, and, although subjected to the severe fire of five enemy planes, he succeeded in destroying one. On November 4, in the region of Baalon, while on a bombing expedition, he encountered an enemy patrol of eight machines, Fokker type. He immediatly dived into their formation and, despite the severe fire to which he was subjected, continued a spirited combat with one of the enemy until it crashed to the ground. Home address, C. S. Bartholf, father, 535 Longwood Avenue, Chicago, Ill.

First Lieut. H. Weir Cook, Air Service, 94th Aero Squadron. For extraordinary heroism in action near the Bois de Dole, France, August 1, 1918. Sighting six enemy single seaters at an altitude of 3,500 meters, Lieut. Cook attacked them despite their numerical superiority, shooting down one and driving off the others. For the following act of extraordinary heroism in action near Crepion, France; October 30, 1918, Lieut. Cook is awarded a bar to be worn with the distinguished service cross. Lieut. Cook attacked three enemy two seaters at an altitude of 1,000 meters. After a few minutes of severe fighting his guns jammed, but after clearing the jam. he returned to the attack, shot down one of his adversaries in flames, and forced the other two to retire to their own lines. Home address, Dr. B. H. Cook, father, 1327 Jackson Street, Anderson, Ind.

For the following act of extraordinary heroism in action near Fontaine, France, November 4, 1918, Lieut. Guthrie. is awarded one bar; as flight commander, Lieutenant Guthrie led his formation of six planes to the attack of seven enemy stroyed, one of which was sent down by this officer. Immediately following this combat he attacked and drove off four hostile machines (type Fokker) which were about to attack one of our planes (type Fokker), six of the enemy were deballoons. Home address, K. R. Guthrie, father, care of A. T. & N. Railway, Mobile, Ala.

First Lieut. Lloyd A. Hamilton (deceased), 17th Aero Squadron. For extraordinary heroism in action at Varssenuere, Belgium, August 13, 1918. Leading a low bombing attack on a German aerodrome thirty miles behind the line, Lieutenant Hamilton destroyed the hangars on the north side of the aerodrome and then attacked a row of enemy machines, flying as low as 20 feet from the ground, despite intense machine-gun fire, and setting fire to three of the German planes. He then turned and fired bursts through the windows of the chateau in which the German pilots were quartered, twenty-six of whom were afterwards reported killed. Next of kin, Rev. John A. Hamilton, father, 25 Buell Street, Burlington, Vt.

First Lieut. Louis G. Bernheimer, Air Service, Pilot, 88th Aero Squadron. For the following act of extraordinary heroism in action near Tailley, France, November 2, 1918: Lieutenant Bernheimer and First Lieut. Ralph P. Bagby, observer, on their own intiative went on a reconnaissance mission, flying fifteen kilometers behind the German lines, securing valuable information on the condition of the bridges across the Meuse River and enemy activity in the back areas and harassing enemy troops. Home address, Sidney Bernheimer, father, 138 East Seventy-second Street, New York City.

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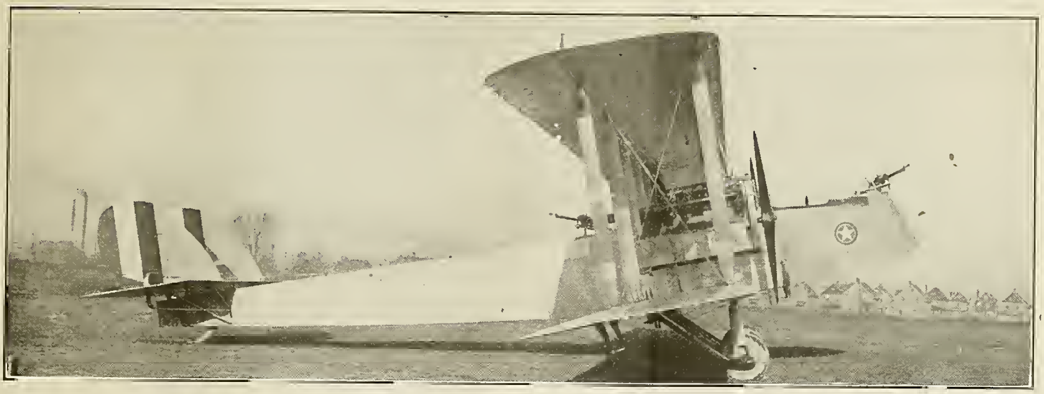

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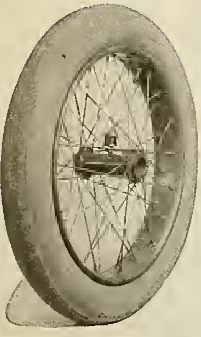

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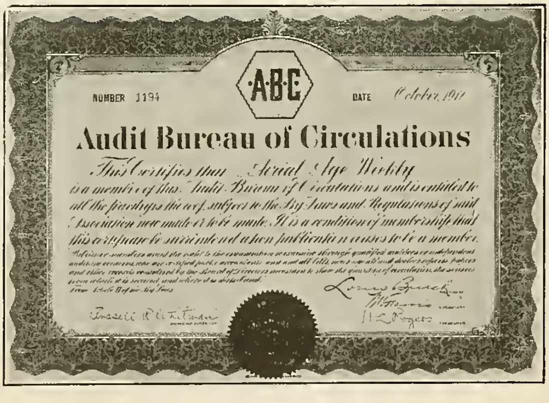
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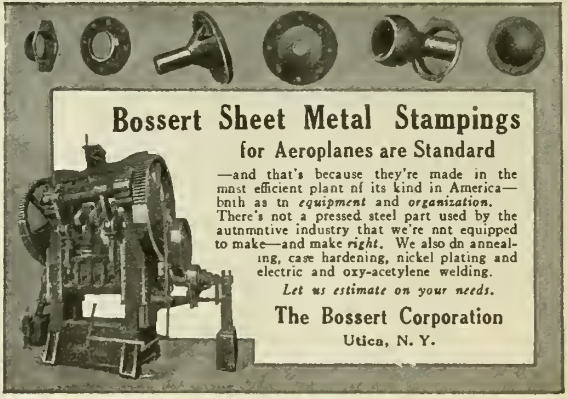

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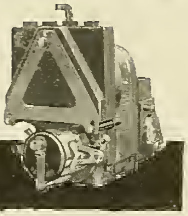

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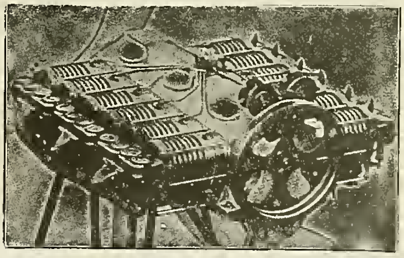

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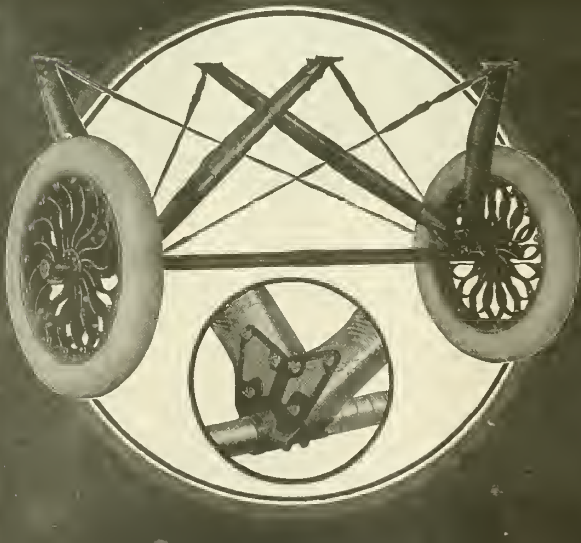
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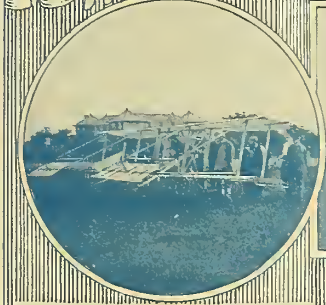
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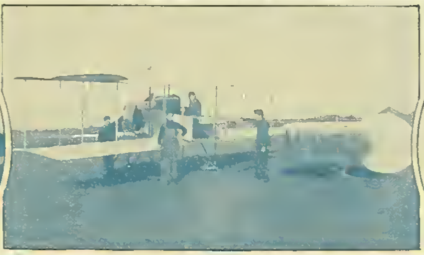
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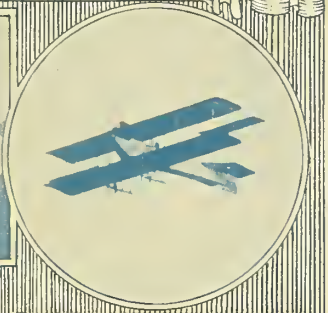
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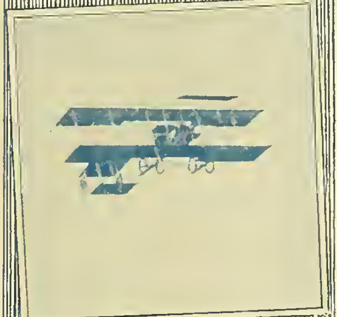
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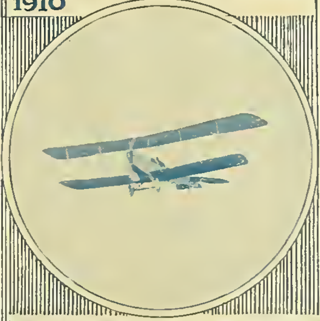
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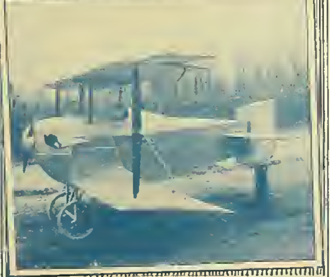
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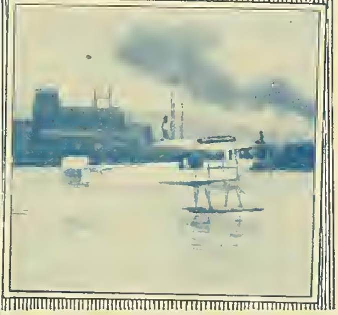
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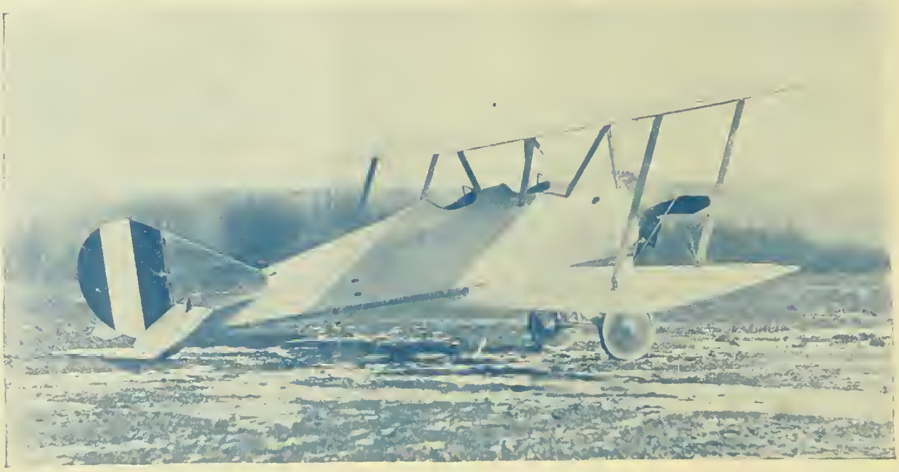

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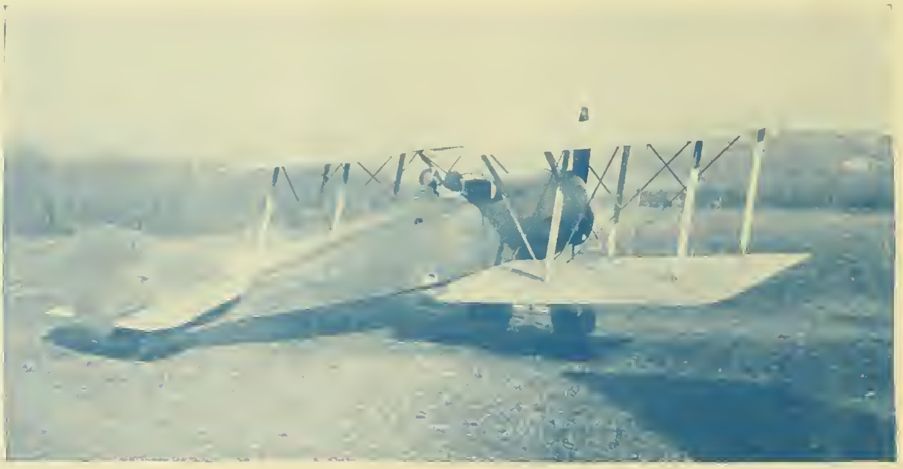

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